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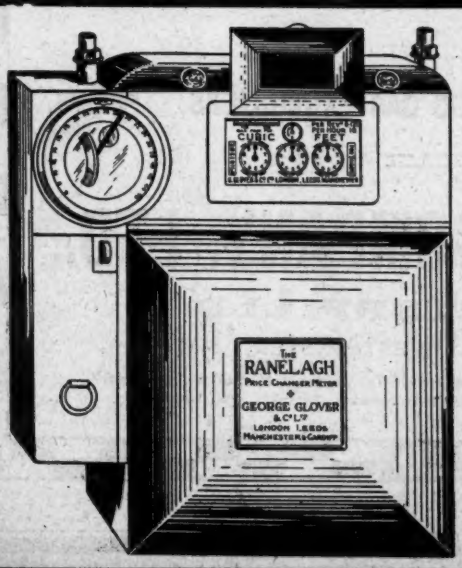

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EDITORIAL NOTES.

Price of Gas Coal—An Unjust Imposition—Short-Term Contracts.

IN no feeble manner, the gas industry as a whole must protest against the latest piece of injustice proposed to be inflicted upon it by the coalowners in certain producing areas. The coalowners of Lancashire, Yorkshire, Derbyshire, Nottinghamshire, Warwickshire, and Leicestershire—and perhaps of other districts—have, at a conference at Derby, singled-out household and gas coal for bearing an increase of 3s. per ton on pre-strike prices, on the ground that it is necessary to maintain the "average" price of coal—that is to say, the average of prices which will not be changed and the prices of the household and gas coal which will be 3s. per ton higher—at a figure which will cover the cost of production. Another reason adduced is that slacks have depreciated in value as compared with the prices that were in operation when the collieries were under Government control. In other words, these coalowners propose that the 53 million tons of coal used before the war for gas and domestic purposes (assuming the owners in other fields follow suit) shall bear the whole burden of any deficiency there may be—not only on the 53 million tons, but upon the 136 million tons (again taking pre-war figures) used by other industries and for other purposes, including, we take it, the generation of electricity. This is a proposal that is as impudent as it is grossly unjust, and one that the gas industry—if we know the mood of the industry after its long period of suffering due more to coal conditions than any others—will not tolerate. In the decisions arrived at at the conference, it is specifically stated that other industrial coal is not to be advanced in price, nor is that to the railway companies in the case of twelve months' contracts; but, in the case of shorter contracts, 1s. per ton advance is to be made on pre-strike prices.

The unfairness of the proposal arbitrarily to lump upon gas and household coal the additional revenue supposed to be required, is seen by the confession that the increases are also intended to assist in covering the cost of the strike, and in putting the pits into working order. Neither the gas industry nor the domestic coal consumers had anything to do with causing the strike nor with the disorganization of the pits; and why they should be despotically selected to bear the brunt of the costs incurred is beyond the grasp of ordinary intelligence, and is altogether immoral. If these costs are to be borne by the consumers of coal, then the burden should be lightened by spreading it over the whole production, and not merely a part of it. The householders of the country should join the gas industry in protesting strongly against this attempt to bleed them, while allowing the greater part of the coal output to go free. The gas industry to-day is in an unenviable position with its secondary products. Their prices have dropped considerably; and they cannot be raised with the demand for them falling short of the supply, while the price of sulphate of ammonia has been fixed at a lower figure. As for coke, the 3s. added to gas coal, and no increase on the price of that consumed by other industries, will make the coke position seriously worse. It will mean that coke made from coal at 3s. per ton dearer will have to compete with industrial coal that has not any increase upon it.

Not only must the gas industry protest against this proposal, but it must actively and sternly resist the imposition, and by every means in its power. There is plenty of labour in the coalfields now, and the wages of the miners are going down. Why? Because the Government, the coalowners, and lastly the miners' leaders themselves confessed that the coal industry could not be restored to a sound economic condition while the price of coal remains at pre-strike figures. As soon, however, as the coalowners recover their temporarily lost power, they shift to new ground, and propose not to reduce, but to increase by 3s. the price of domestic and gas coal—gas coal which supplies with gas and coke and other commodities industries and domestic consumers, among the latter of whom are millions of poor people.

Not only is there plenty of labour in the coalfields, but industry generally is not a large consumer of coal at present, and this is summer time when householders do not require much fuel. There will be, if we read the signs correctly, a glut of coal before long, and then its price must come down, unless the owners have the power to maintain it fictitiously, which we doubt. Not only do we strongly advise gas undertakings not to entertain such terms as a 3s. per ton advance on pre-strike prices, but we urge them with equal insistence not to enter into long-term contracts at pre-strike figures. Gas undertakings must not do anything to assist in keeping-up prices artificially by entering into long-term contracts. Unless the industry exercises great care, it will help to fix arbitrarily high prices for coal, and so further penalize both gas consumers and shareholders, who for years have had a very sorry time. Now the coalowners in the districts named are trying to make things more desperate still for the industry. However, apart from the question of the 3s. increase, if long contracts are entered into, they should be subject to the price rise-and-fall clause, which should in common fairness be retained. If, for example, twelve months' contracts are entered into at a price not exceeding initially those prevailing on March 31 last, then a condition should be inserted for revision each quarter. It is understood that this is the plan the railway companies and other large coal consumers are adopting. The time has come for united action over gas-coal prices; and there must be no weakness in respect of the 3s. increase per ton on gas and household coal only. If there is weakness now, the effects will be felt far ahead. The coal industry generally must be subject to economic conditions, and not to the arbitrary decisions of the coalowners.

After the Strike.

THE miners, or as many of them as could do so, have returned to the pits. The leaders are secretly contemplating the grim havoc and loss which the great adventure for political purposes has cost the Unions and the men, to say nothing of that of the country generally. The leaders have been remarkably quiet since the order was issued for the men to return to work. The order was one thing; but, when given, the knowledge was in the background that many of the collieries would need time for their restoration before coal-raising could be resumed, that it would not pay to spend the money required to put some into productive position again, that before the strike the pits were severely overmanned, and that, if the coal industry is to return to a state of prosperity and the export coal trade is to be recovered, there will have to be greater production per man. The cost has been heavy for the country; but if it results in bringing men to see in a saner light the facts of our national position, and that there will arise a better spirit of co-operation in trying, as far as is humanly possible, to make good what the war has taken from us, the strike will not have been altogether useless and wasteful. The worst that was feared when economic conditions compelled the country to come to grips with the most serious of industrial problems has not happened; and for this there is thankfulness.

The Government have been denounced for decontrolling the coal industry before the expected time. They do not know everything, and cannot be blamed for not knowing months before that there would be such a break in trade conditions that continued control would cost the country a million-and-a-half sterling per week—and more as export prices dwindled away to a still lower level. Had decontrol been delayed, whenever it happened, the political ideals of the extremist element among the miners' leaders as to a national pool and a national wages board would still have been sought, and the trouble entailed would have had to be faced. But now it is over. The trade unions have been shown that they must confine their efforts to legitimate industrial matters, and leave questions of national moment to the decision of elected representatives of the nation.

Another lesson of the strike has been that the methods of the extremists are to-day no good for making fictitiously based adjustments in order to end trade disputes, and that the unions must reform their ways, and get on to the lines of constitutional practices. These the competent leaders know are the best. The miners have put the efficacy of the national strike to the test. They have found it wanting; and the lesson will not be lost upon those with well-balanced intellects among union leaders. There had been proof enough before that the strike is now an obsolete weapon—a weapon which impoverishes, and does not construct. The greatest effect is to inflict incalculable misery, and to the heaviest degree upon the workers throughout the country. The unions and many of their leaders have neglected to place sufficient weight upon the fact that progress has been general—that progress in men's skill, in machinery, and in alternative ways of doing things have taken the keen edge off the strike, and that its real achievements are not those which are actually sought. The rank-and-file of the unions should now make a wiser discrimination of men to take the responsible part of leaders, and see that politic counsel reigns. There is no room or use for those fanatics who think that the process of making things better is by destroying the means of creating prosperity. Work only can produce wealth. Out of the coal strike has issued profit-sharing; but only work and attractive prices can produce the surplus profits to share. Profit-sharing on an equitable basis, and not strikes, should in future be the policy of the trade unions.

However, after losing 70 million man-days, the miners are back at work again; and the numbers on the active list are increasing day by day, though it will take time before coal supplies are again adequate, and before there can be any hope of prices being reduced. Here and there, difficulty still obtains. The Staveley Coal and Iron Company have been making a stand against a condition which ought never to have been agreed to, which is very largely accountable for much of the dirt that is now sold as coal, and which inflicts upon transport and industry an untold amount of uneconomy. That is the change from the fork to the shovel in filling the tubs. The Staveley Company informed their men—some 10,000 of them—that they intended in future to stand on their own legs, and to have, as was the case before the war, their coal forked, and not shovelled. If they carry insistence to performance, they will merit the thanks of all consumers, and will have no trouble to search for custom when their pits are again yielding. There was also some delay in one part of South Staffordshire in re-starting pits—some 6000 men being affected—through the owners declining to resume war-time conditions and customs. It is time the men learned that the war is over, and that there is now no deficiency of labour, which deficiency brought into existence conditions that ought not to be claimed, and that cannot be entertained, in peace time.

For the gas industry, the position in regard to coal is at the present time a trifle nebulous. Many undertakings will be glad to get rid of the inferior grades of imported coal that have reached them. A large quantity of such coal—a quantity considerably in excess of the superior grades—has found its way here at high prices. But as yet the volume of British coal that is being distributed in the country is not great; and some weeks will probably elapse before the coal position and prospects will become more clearly defined. Meanwhile the prices of secondary products have fallen heavily. We know now what the price of sulphate of ammonia is to be—sulphate of good quality (25¾ p.ct. ammonia, and neutral). But as to the future prices of coke and tar, these will before long be very much subject to the character of the demand; and the demand will be in the main governed by the revival of other industries. The position at the moment is one in which nothing is to be gained by speculative forecasts. We can only watch for developments, and hope—perhaps not too confidently—for the best.

Important Electricity Generating Project at Beckton.

THERE has often been electrical journalistic laughter over all suggestions as to working combination between the gas and the electricity industries. But while the journalists have laughed and twitted, skilled engineers have been at work, and have discovered that there would be for such combination mutual advantages of no mean an order, and that the fuel with which gas undertakings can supply electricity stations have potential merits in respect of increasing boiler efficiency—particularly when using slack, which can be bought at a cheaper rate than steam-raising coal. The matter of conjoint working has been advanced another stage, and an important one, by the evidence that Mr. G. W. Partridge, the Chief Engineer of the London Electric Supply Corporation, and Mr. D. Milne Watson, the Governor of the Gas Light and Coke Company, have given before the Electricity Commissioners in connection with the London electricity supply schemes. When we see: (1) that their evidence, and a scheme for erecting a super-power station on part of the land belonging to the Gas Light and Coke Company at Beckton, are supported by Sir Alexander Kennedy, Mr. J. H. Rider, and Mr. C. H. Wordingham, (2) that the scheme is being promoted by nine of the London Electricity Supply Companies, whose engineers must therefore be in agreement, (3) that the Chief Engineer of the Gas Light and Coke Company (Mr. Thomas Goulden) recently said in his Presidential Address to the Institution of Gas Engineers that "it is a matter for serious "consideration whether the whole question of coal conser-"vation so far as the future of electricity generation is con-"cerned should be re-opened with the view to ascertaining "whether the economical production of both gas and elec-"tricity cannot be better secured by combination and co-"operation rather than by continuing on the divergent lines "hitherto followed"—then we think there is in these facts sufficient to give pause to ridicule, and for serious consideration by people who, on superficial grounds and no clear reasoning, have scouted the idea of mutual interests and help between gas and electricity.

Both gas undertakings and electricity concerns desire to supply their commodity at the lowest possible price. The gas industry has no qualms as to helping electricity to economies and so a lower price, if the assistance will also help gas to economies, and therefore a lower price. This would be a public advantage. Let us see what Beckton offers. There would be nine acres of land on lease for 99 years, to accommodate a generating station having a capacity of 200,000 KW.; and Mr. Milne Watson says that personally he sees no difficulty in making some arrangement regarding the plant at the termination of that period. There would be available from the retort-houses close at hand a large quantity of coke and coke breeze—coke usually costs less than coal, and coke breeze about half the price of coal. Through this availability of fuel, less coal storage would have to be provided by electricity. Waste heat utilization is a modern development in gas manufacture; and there must be a large quantity of waste heat available at Beckton, with the big capacity water-gas sets there. Any surplus steam could go direct to the electricity station for profitable utilization. Then a better use could be made of the capital outlay the Gas Company have invested in wharves, piers, railway sidings, &c. A large capital expenditure would be saved by the electricity station in these respects; and the consideration paid by the electricity station for the use of these conveniences would help the Gas Company's capital and maintenance charges for this material-handling plant. It is also clear that, a good proportion of coke being simply transferred from the retorts to the steam-boilers, instead of at least an equal proportion of coal being conveyed for electricity generation, there would be savings in fuel transport. Power gas development by gas undertakings is also provided for in modern gas legislation. Economies and savings therefore extend in several directions; but while the scheme is only in an embryonic state, and some time yet may elapse before it materializes, it is impossible to give any reliable estimates.

The question of thermal efficiency, and making the best use of our fuel supplies, is a very live one at the present time; and this latest scheme is a plain invitation to electricity and gas undertakings to look more critically than has hitherto been the case into the subject of mutual development in production. In fact, seeing the awkward position that has been reached by electricity generation concentration projects (which look as though they will have to be shelved for some time to come), it would be well worth while to consider the alternative of developing for local supply new generating plant next door to gas-works, and thus saving the expenses and losses of distant distribution, and the costs of huge water requirements for condensation purposes. The use of coke for steam generation, or coke or breeze with slack on the Nicol patent "Sandwich" system, is to-day no novel thing with several prominent electrical engineers. It has been tried on a large working scale in electricity stations and large industrial establishments, and has been found a financial advantage, with—through the assistance the porous coke is to the density of the slack in making an excellent fuel bed—high efficiency effects as an additional credit. Mr. Nicol was telling us recently that at one power station in London, with a 50 p.ct. admixture of coke breeze and slack on the "Sandwich" system, the average evaporation is, from and at 212° Fahr., 7·8 lbs. per pound of mixed fuel, as compared with an evaporation of 6·8 lbs. per pound of coal at another station—a difference of 13·3 p.ct. in favour of the coke breeze and slack. The average price of the combined fuel at the more steam-efficient station is 10s. per ton less than the coal at the other one. Using unscreened crushed coke as a diluent, the evaporation obtained per pound of the mixed fuel during a short test was over 9 lbs.

However, new relations have, through this use of coke and breeze, been entered into with the electricity industry, which finds it a healthy relationship. Beckton promises an extension of it, and a demonstration of utility and economy of front-rank order. If the scheme is carried through, what will it lead to? No one can say. Evolution continues, despite the ridicule of people suffering from mental myopy.

The Sliding-Scale and Gas-Stove Rents.

THE question of the increase of gas-stove rents has been the subject of an inquiry under the Profiteering Acts by a Sub-Committee appointed by the Standing Committee on the Investigation of Prices. Some time since there was quite an outcry against these increases; the public considering that, though prices of materials and labour had gone up, as well as the cost of replacing gas apparatus that had become worn out or obsolescent, there was no justification for gas undertakings advancing the rents of such appliances bought at pre-war prices. Those things, however, that were bought at pre-war prices have become subject to every increase of cost which the new economic conditions have brought about. The Sub-Committee utilized a complaint against the Wandsworth, Wimbledon, and Epsom District Gas Company as a sort of test case; and though the investigation was of an extended order, and the report long and critical in respect of the detail of the accounts bearing upon the subject, the whole matter finds a very proper ending in the conclusion of the Sub-Committee that the total capital employed on the whole of the business is very low. Therefore they do not consider that the increases in the rentals charged for gas apparatus can be said to have resulted in an unreasonable profit—viewing the business as a whole. This is a very rational view, though there is something to be said for the opinion of the Sub-Committee that accounts applying to the hiring-out business and the appliances so hired should be strictly and separately kept.

There is a point, however, in the report indicating that the members of the Profiteering Sub-Committee are not particularly conversant with the subject upon which their judgment was sought. They state that they desire to draw the attention of the Board of Trade to the possibility that in normal times, when the operation of the sliding-scale has been resumed, gas companies may, by means of increased rentals for apparatus, secure such an additional revenue as will enable high dividends to be paid, while keeping the price of gas low. Upon this assumption they say that this would, in effect, involve a differential charge against the users of such apparatus who would be forced to subsidize the large-scale consumers of gas. The gas companies would thus be able to evade to some extent the intention of the sliding-scale, at the expense moreover of a particular class of consumers. This is a contention that is as highly interesting as it is absurd. In the first place, there is no compulsion on the part of gas companies to hire-out gas-consuming appliances. The hiring-out is a policy that was adopted solely with the idea of enlarging the consumption of gas; and the greater the increase of consumption in the daytime, the better for the consumers of gas generally, and the better for the shareholders under the sliding-scale. There is no object in the companies doing anything that will be detrimental to their gas-stove business; there is every reason for encouraging the expansion of gas use. But there would not be fairness in running a hiring-out branch of the business at a loss, which would mean that the loss would have to be borne by the gas consumers in proportion to their use of gas.

Regarding the suggestion that, by making the hire charge high, which would to some extent keep the price of gas low, and so benefit the shareholders under the sliding-scale, it would have been interesting if the Sub-Committee, instead of indulging in generalization, had made an actual computation to show what such action in a specific case would represent in respect of the price of gas and the effect upon dividend. On the other hand, we will submit another generalization to set against theirs. Gas-stoves are good consumers of gas; and therefore we suggest the lower the price of gas per 1000 c.ft. or per therm, the better for the users of gas-stoves on hire. The saving on the gas set against the increased charge for the hire of the apparatus would, we should imagine, show a balance (if there is a balance one side or the other) in favour of the consumer, for the increases in prices per therm may be in 0·2d. steps, and in prices per 1000 c.ft. in 1d. steps. Anyway there is nothing in the point made by the Sub-Committee, although apparently they think there is, and so they call the attention of the Board of Trade to it. The Board, we fancy, will at once see what a trifling matter it is.

Examinations and Imperfectly Prepared Candidates.

No young man nowadays can hope to succeed as a technical member of the commercial staff of a gas undertaking if he lacks the ability to sketch, is deficient in descriptive power, or has unsatisfactory knowledge regarding the most elementary technique connected with the utilization of gas. But these are, it is regrettable to learn, the conditions of many candidates who present themselves for examination in "Gas Supply." So much so is this the case, that there has been correspondence on the subject between Mr. H. Kendrick, the Examiner in Gas Supply, and the City and Guilds of London Institute; and the correspondence has been before the Council of the Institution of Gas Engineers, who have asked us specially to emphasize the matter so as to draw to it the attention of the lecturers and teachers at technical schools and colleges. We do so with pleasure, as there is confidence no complaint would have been made by Mr. Kendrick regarding the deficiencies without very good cause. Moreover, it is to the interests of the gas industry generally that the level of competence of men seeking staff employment in the distribution and sales departments of gas undertakings should be raised, and especially at this time when the industry is transferring its trading from the volumetric to the heat-unit basis, has had imposed upon it the duty of adjusting consumers' appliances to meet the changes that may be made in the gas supplied, and will have to meet sterner competition than ever before. The technical men on the commercial staffs of some gas undertakings are at high-water mark in these matters; but we know not only from hearsay, but from personal knowledge and experience, that this is not universally the case. There has to be improvement. But improvement is not taking place at the pace that we should like to see; and this is evidenced by the criticisms, which must be taken also as suggestions, by Mr. Kendrick. At the same time, we should not like to put all the blame of the want of preparation for the examinations at the doors of the lecturers and teachers at the technical schools and colleges. They cannot compel industry on the part of the students; and we should be very much inclined to attribute part at any rate of the ground for criticism to indifference or low power of acquisitiveness of the candidates themselves. But may it be suggested to the lecturers and teachers that, seeing that students vary so much in the matter of ability, there should be a good elas-

ticity and not too great a rigidity about the methods and scope of imparting knowledge.

Better preparation in sketching (which is found to be very poor) is urged by Mr. Kendrick, as from this an examiner is often able to obtain a clearer insight into the knowledge of a student than he is from any mere written description. Anyway this is a useful accomplishment for any one seeking promotion in the supply department of a gas undertaking. Then many of the candidates are found wanting in descriptive power. There is nothing new in this. It is an all too common deficiency. There is, however, every reason why students should do all they can to cultivate the art of expressing themselves on paper with perspicuity and conciseness. On the other hand, it is as much a failure to hide one's meaning by being prolix as it is to be vague and incomplete in essential detail. Either one form or the other of deficiency in the power of clear expression in composition adds to the perplexities of the examiner; and we detect a feeling lurking in Mr. Kendrick's mind that possessed knowledge is often obscured by the want of descriptive power, which, if not a gift, can be improved by cultivation. The fact of actual knowledge being so hidden is a detriment to the candidate himself in the examination; and one cannot help being sorry for such men. Further, the examination papers point to the existence of unbalanced information. In Grade I., some of the candidates concentrate on three or four questions, and avoid others. This indicates a lack of knowledge in some directions, and a lively interest in others. In respect of this grade, it is urged that special attention should be given to mains, internal piping, burner efficiencies, lamps, and industrial furnaces. In regard to the Final Grade, there is acknowledgment that the candidates show a more satisfactory level of knowledge. It would be a bad thing for themselves and all concerned in the future of gas supply and utilization if they did not; but even in this grade, there is a poorness about the answers in connection with such matters as gas-meters, high-pressure lighting, street lighting, and industrial furnaces. It is hoped now that the attention of lecturers, teachers, and candidates has been called to these matters that the qualifications necessary in candidates for examination and in aspirants for positions in the supply and sales departments of gas undertakings will show themselves in more pronounced form in the results of the examinations than it is manifest, from the criticism and suggestions, they have been doing hitherto.

Available Coke-Oven Gas—A Board of Trade Inquiry.

THE country has just emerged from the largest coal strike in history. Gas undertakings that were relying in part upon coke-oven gas had this source of supply cut off; and had, in consequence, to press their water-gas plants for all they were worth, and to light-up and set to work carbonizing plant that had been looked upon as more or less derelict. The experience was not a nice one. But, at the same time, gas administrators know that coal strikes are not of daily occurrence; and, if there is economy in utilizing coke-oven gas, it is their business to gain the economy. At the same time, they have to be prepared for the contingency of a strike. This is a drawback; and it takes some of the gilt off the advantages of purchasing coke-oven gas in bulk. The Board of Trade have been making an investigation to obtain some idea as to the amount of the gas that is available, under normal working conditions, for sale in bulk to gas undertakings or for other purposes; and we are rather surprised at the comparative smallness of the result, even allowing for the 15 p.ct. of bye-product ovens not accounted for in the returns. The result points to this, that if bye-product coke-ovens are to take a greater part than they are at present doing in contributing to communal requirements for therms in a labour-saving form, their owners will have to liberate more good gas by utilizing inferior fuel for the making of producer gas for oven heating.

We will examine the figures. But, before doing so, it may be mentioned that it is clear the Board were influenced in making the inquiry by what important gas undertakings have already done in purchasing and utilizing coke-oven gas, and by the power that is conferred upon the Board by section 10 of the Gas Regulation Act to authorize gas undertakings to purchase gas in bulk. The Board desire to encourage this. The development is regarded by them as an important step in coal conservation. But it is added:

By this means the coal consumption of gas undertakings "will be appreciably diminished, and supplies set free for "other purposes." We hope not. What gas undertakings are out for is not only to use gas purchased in bulk, and to produce more therms per ton of coal for sale, but to carbonize more of the coal that is now burned in the raw state, and so largely wasted, together with valuable constituents. This way lies real coal conservation.

The investigation by the Board (as will be seen by an article elsewhere) produced returns from 7275 bye-product ovens, which is about 85 p.ct. of the total number. These 7275 ovens carbonize approximately 14½ million tons of coal a year; and the average production of gas is about 10,000 c.ft. per ton—the calorific value varying between 420 and 550 B.Th.U. gross. Of the 7275 ovens, 4265 are of the recuperative or waste-heat type; and they use for heating from 60 to 100 p.ct. of the gas produced. Only 3010 (or 41·37 p.ct.) are of the regenerative type, and use 50 to 60 p.ct. of the gas for heating purposes. According to the figures, of the remaining gas 37,250,000,000 c.ft. are burned by the owners of the ovens for purposes other than oven heating; and the surplus available for sale is 7,250,000,000 c.ft. This is not only a disappointing figure, but it is rather a surprising one. It only represents, at 10,000 c.ft. per ton, 725,079 tons of coal. There is not much chance, owing to location, of the Gas Light and Coke Company ever buying gas in bulk from coke-ovens; but out of their total production of gas last year of 35,141,709,000 c.ft., they made 7,350,793,000 c.ft. of water gas, which quantity of water gas is in excess of the amount of gas available for disposal from the 7275 coke-ovens. Before this investigation (assuming the Board of Trade figures are correct), it had been assumed that a far larger quantity of gas was liberated for purchase from the coke-ovens. The 15 p.ct. of the ovens not included would, of course, raise the figure; but it seems to us that, to get a material increase in the available gas, the adoption of the regenerative type of oven would have to become universal, or, better still, producer gas be used for oven-heating and other purposes. It does seem a pity that such excellent thermal value gas should not be used for more refined purposes than the heating of ovens, boilers, and so forth; and refined uses are found along the gas distribution systems of our cities and towns.

Institution Annual Meeting.

Provisionally, members of the Institution will make a note in their diaries of Oct. 11 and the three following days for the deferred annual meeting of the Institution of Gas Engineers. The Council have fixed upon those days subject to their being convenient to the members of the Société Technique du Gaz for their postponed visit.

Capital Raising and No Autumn Session.

Gas companies who are contemplating raising money under the Public Utility Companies (Capital Issues) Act had better hurry-up, and make their arrangements. It is hoped by the Government that nothing will arise to occasion an autumn session of Parliament. If this hope is realized, Parliament may not be sitting for some months, when once the House rises; and so gas companies with large overdrafts from bankers may be placed in a very awkward position. Subsection iii. of clause 1 of the Capital Issues Act says: "No consent given by a Department in pursuance of this Act shall have effect until a report of the circumstances of the case has been presented to Parliament by the Department, and has lain upon the table of each House of Parliament for a period of not less than twenty-one days during which the House has sat."

Record Fuel Imports.

June of this year established a record for the import of fuel. From the beginning of the year and owing to the coal strike, 1,849,537 tons of coal have been landed here. Of this amount no less than 1,400,000 tons were received in June; the value being given as £5,022,371. In the same month, 100 million gallons of petroleum—chiefly fuel oil and motor spirit—were imported. The imports for the first six months under this head reached 525 million gallons—an increase of roundly 125 millions. Our French neighbours, we see, wish it to be known that it would be unjust to include them among those who have profiteered out of the coal strike. The price of French coal came to 120 to 125 frs. per ton delivered in British harbours—that is, at the exchange of 50 frs.

per pound sterling, from £2 8s. to £2 10s. The price of Sarre coal was £2 16s.; of German coal stocked in France, £3 4s.; and German coal delivered direct viâ Rotterdam £1 18s. The prices were exactly those paid by French consumers, and constituted a very valuable concession—especially considering the prices paid by the French for British coal during recent years.

No Railway Strike Danger.

Railway decontrol takes place on Aug. 15; and it is expected that the new grouping of the lines will come into operation after that date. It is a satisfaction to learn from Mr. J. H. Thomas, in a speech at the conference last week of the National Union of Railwaymen, that he does not see anything in the railway service to warrant the assumption that there is likely to be a strike. The railwaymen have not got nationalization; but in their agreements with the Government, Mr. Thomas considers they have "done very well."

PERSONAL.

Mr. LEONARD GEORGE HUMPHRYS, son of Mr. F. C. Humphrys of Ilkeston, has been appointed Gas Engineer and Manager to the Bexhill Water and Gas Company. Mr. Humphrys, since his demobilization from the army, has held the position of Deputy Resident Manager of the Litchurch station, the largest works of the Derby Gas Light and Coke Company. After serving his articles under Mr. J. Ferguson Bell, he became Manager of the Belper station of the Company, which position he held until joining the army in September, 1914. During the war, Mr. Humphrys served in the 21st Battalion, Royal Fusiliers, afterwards taking a Commission in the 11th Sherwood Foresters, with which battalion he went to France. After being wounded on July 1, 1916, he was transferred to the Royal Engineers. Mr. Humphrys is a bronze medallist in "Gas Engineering," Grade I., and also holds first-class honours in the same subject. In addition, he has the engineering certificate awarded by the Derby Technical College, which embraces eleven certificates in engineering and allied subjects. He is a lecturer in gas engineering at the Derby Technical College.

On the occasion of his retirement from the Chair of Chemistry at Armstrong College, Newcastle, Prof. P. P. BEDSON, M.A., D.Sc., F.I.C., F.C.S., was presented by members of various chemical societies with a handsome bookcase bearing a suitably inscribed silver plate. The presentation was made by Dr. J. T. Dunn, the Newcastle City Analyst, who referred to the long association he had had with Prof. Bedson—they having served in the college together from practically the same date. Among other work, Prof. Bedson has carried out valuable researches into the nature of coal dust and its relation to explosions in mines.

OBITUARY.

We regret to learn of the death, last Saturday week, the 2nd inst., of Mr. ERNEST FRITH, the Engineer and Secretary to the Frodsham Gas and Water Company. He had a serious attack of double pneumonia two months ago; and although he made satisfactory recovery from this, he suddenly developed meningitis, which terminated fatally. Mr. Frith, who was only 41 years of age, was the youngest son of the late Mr. J. R. Frith, of Runcorn. He was Assistant to his father at Runcorn until March, 1912, when, on the retirement of his father, his brother Mr. G. S. Frith became Secretary and Manager of the Runcorn works, while the deceased was appointed to a similar position at the Frodsham Gas-Works in succession to Mr. George Frith. The funeral took place at Frodsham Parish Church on Tuesday afternoon of last week; the bearers being employees of the Frodsham Gas Company.

North British Association of Gas Managers.—The annual general meeting of this Association will take place in Perth on Thursday and Friday, the 8th and 9th of September. The Honorary Secretaryship of the Western District Commercial Section of the Association has been taken over by Mr. Archibald Kellock, Gas Manager, Airdrie, as from 1st. inst. Mr. David Fulton, of Helensburgh, is still the Secretary of the Association itself.

Recent Wills.—One of the latest wills to be proved is that of Mr. Walter B. King, tar distiller, of Ipswich, who left estate of the gross value of £20,193. Mr. E. F. Vesey Knox, K.C., left £26,322. Mr. S. B. Beaumont, who was Chairman of the Elland-cum-Greetland Gas Company, has left estate of the gross value of £22,106. Mr. J. G. Rowe, the Chairman of the Weymouth Consumers' Gas Company, left £13,512, with net personalty £2186.

ELECTRICITY SUPPLY MEMORANDA.

THE linking-up of electricity undertakings has been very much before the Electricity Commissioners during their inquiry into the electricity generation schemes for London and the Home Counties.

Gas and Electricity Producing Combinations.

But the most fascinating and novel "linking-up" scheme they have had before them has been the proposal of nine of the electricity companies of London to erect a large power station at Beckton on a site to be leased from the Gas Light and Coke Company. For a station on the site, there would be available a large supply of coke and breeze; and developments at gas-works show that a considerable volume of steam will also in future be produced by waste heat, especially from water-gas plants. Moreover, at Beckton, the huge generating station would be able to receive materials coming by way of sea and river, and have them handled by the large cranes on the big jetties already existing in conjunction with the railway sidings that run through the Beckton Gas-Works. Of course, for the fuel and the waste heat or steam, together with the materials' handling conveniences offered by the Gas Company, the owners of the electricity generating station would have to pay. Advantages would accrue to the Gas Company, and economies to the electricity station. The economies and the advantages stare one so boldly in the face that the surprising thing is that such combinations have not had practical effect given to them before this. There is nothing fresh in the idea of joint working in this way. But this is a combination on the magnificent scale; and we expect much from it. High costs for money, plant, materials, and labour, have given a fresh and attractive polish to the policy of a working alliance under which fuel that the gas-retorts are ever yielding will be consumed by a gigantic neighbour with a considerable appetite. This is good; and we hope to see materialized this considerable demonstration of reciprocal help for mutual interests. These matters are dealt with in an editorial article in this issue; and to this readers who are interested will probably make reference.

Fuel Economy.

The "Electrical Review" is getting strong upon fuel economy. We have all during recent years been stirred-up regarding this subject—some more so than others. Our contemporary has reminded its readers that fuel economy is at the very basis of the reports which led to the formulation of a national scheme for electricity generation. As it says, this fact has not in the least diminished in weight. Rather the contrary, though it does not appear to be receiving much attention now-a-days. This is the opinion of the "Review;" but, as a matter of fact, it is (if not in all electrical circles) receiving more attention than ever. People, however, are coming to the conclusion that even fuel economy can be purchased too dearly. Our contemporary does not appear to think much of the "fuel economy" to be derived from the linking-up of electricity stations as compared with the economy that may be derived from super-power stations. But linking-up, there can be no denial, will effect some economy; and the question is whether the fuel economy that would be realized by pursuing the super-station policy (we are not referring to the scheme at Beckton, because the circumstances there are peculiar) would not be purchased at a price which would wholly submerge the fuel-economy benefit. Says the "Review:" "While working out the most rational procedure in dealing with this complex question, let us not forget all about the main plank in our platform—fuel economy." It should have been added "But do not let us buy fuel economy too expensively." It would be interesting for our contemporary to consider the question of fuel economy, capital charges, and working expenditure from the point of view of the Beckton scheme, and then tell its readers what it thinks of it.

Continued Use of Oil Fuel.

Now that the coal strike is over, the question is being asked what about the boilers that have been converted to fuel-oil firing at electricity stations—will they be reconverted? Of course, all boilers at electricity stations where oil-firing has been adopted have not been so treated; and some of them have been altered so that they can be readily used either for solid or for liquid fuel. The partial use of boilers with one fuel or the other will not matter much to the station engineer provided there is economy in so doing. The whole question will hinge on the price of coal and oil respectively, though the price, *per se*, per ton of oil or coal does not compass all consideration. Interchangeability will mean greater flexibility for the station, and will remove the working of the station from entire dependence upon one class of fuel. Oil, too, can be burned more efficiently. More pounds of water can be evaporated per pound of oil than per pound of coal. This is due not only to the fact that fuel oil has a higher calorific value per pound than coal, but the combustion is more direct and cleaner; and heating can be maintained absolutely uniformly. Valuable also is the ability to regulate to a nicety the injection of the oil. In a test with the Wilton oil-burner, with steam injection, the evaporation was no less than 10·27 lbs. of water, or 11·75 lbs. from and at 212° Fahr. The calorific value of the oil in this case was 17,381 B.Th.U. per lb.; and the boiler efficiency

was 65·52 p.ct. Through the various advantages, a greater duty can be obtained from the boilers with the fuel oil. Less labour is required; there is no stoking to be done, and no ashes to be removed. Altogether the condition of the boilers is more perfectly maintained for work than when coal alone is employed. Thus it is that the question of economy must be decided by the final cost of the steam per unit of electricity generated. It is no use taking for comparison the bare costs of the oil and coal. The factors that come into play in connection with their respective applications are totally dissimilar. If the price of coal falls, the price of fuel oil will have to drop very considerably; otherwise it will not pay to continue its use. At the same time there will be a reluctance on the part of electrical engineers to get rid of the oil equipment of those boilers that have been converted, or at any rate some of them, if only from the point of view of giving them greater scope in their generating operations. Notwithstanding that the bulk of the oil is imported (which is a disadvantage in war time, and a national financial detriment in peace time), we believe that partial boiler firing by oil in electricity stations has come to stay.

Conversions Still in Progress.

Some electrical engineers are still proceeding with the conversion to oil of part of their steam-raising plant. For instance, Mr. John Christie, the Electrical Engineer to the Brighton Corporation, has received authority to use oil fuel at the Southwick generating station. To utilize oil partially is an old desire of Mr. Christie; and he has been authorized to spend the necessary money. It is estimated that for the piping, valves, pumps, heating, filtering plant, and burners, about £4500 will be required; and suitable oil-storage capacity will need another £2500. This work, it is calculated, will enable about one-third of the present boiler plant to be run independently of coal; and, as an emergency, to maintain an efficient supply for the ordinary needs of the undertaking. The calculation as to the quantity of oil that will be required is 5000 tons a year, which will mean a reduction of about 10,000 tons of coal on the present electricity output. Then harbour-dues for oil will be covered by about 10d. per ton, as against 1s. 8d. per ton for coal; and this alone will effect a large saving. At Hammersmith, too, the Electrical Engineer and the Electricity Committee are so convinced that the policy of having a fuel stand-by is a healthy one, that they are going forward with the conversion to oil-firing of part of their boilers. Among other advantages, they see a reduction of the trouble of ash disposal, and an increase in boiling-cleaning facilities. It is quite apparent, with the additional use of coke, coke breeze, and oil fuel, that electricity stations will progressively require less raw coal than they have done in the past in proportion to output.

Increase in Fuel Oil Imports.

There has been a wonderful increase in the fuel oil imports since the beginning of the year. In the first five months, no less than 197,896,265 gallons of oil have been imported. In January the quantity was 28,691,484 gallons; in February, 33,515,258 gallons; in March, 41,148,617 gallons; in April, 46,588,689 gallons; in May, 47,952,217 gallons. It will therefore be observed that the quantity imported has been on the increase right away from the beginning of the year. The coal strike threw its shadow before it. The oil importers did not overlook the fact, and accordingly made preparations for a long struggle. They were wise, and have profited well from their acumen.

Higher Charges for Power.

Some electricity undertakings made good profits in the financial year ended in March last. But from many other quarters there still arrives fresh intelligence of additional losses on the year's trading. Coming upon this, the coal strike—with its paralyzing effect on industries, and its imposition upon generating costs—has caused profound concern to the administrators of numerous undertakings; and prices in such cases are again going up to cover the losses. This is inevitable in the case of some of the supplying companies; and it is morally right in the case of supplying local authorities. With the latter, such losses ought not to fall upon the ratepayers, who have their own increased burdens due to the strike. Those who are consumers of gas for light, heat, and power, will have to bear the increased charges where the extra expenditure necessitates them; and thus it would be totally wrong that they should have their rates increased in order to pay part of the same extra expenses of the electricity service municipally provided. Particular attention, we notice, is being given to the charges to electric power users. There is a big margin here between actual charges and the maximum authorized price; and where maximum charges have been reached for lighting, quite a sensible course is to make the power consumers pay more. In fact, in any case they ought to pay their fair proportion of the increased costs of generation; for higher costs are not peculiar to one particular branch of the electricity supply service. But some electricity suppliers say that they have to be careful about charging a higher price for energy for power, because of the ease with which extra charges would put electric power outside competitive bounds. But surely the power consumers should pay all the costs of the service. If they do not, somebody else has to. Just a few examples of increases. At Coventry, the flat-rate for lighting is to be 8d. per unit, and maximum demand rates are also increased. The rate for bulk supplies is increased by 0·5d. per unit; low-pressure power is to be 2½d. per unit; while for domestic purposes other than lighting, the price is to be 3d. per unit. The Bournemouth and Poole Electricity Supply Company have altered their scale of charges for power purposes as follows: Up to 1000 units consumed per quarter, 3½d. per unit; 1000 to 2000 units, 3d. per unit; 2000 to 5000, 2½d. per unit; 5000 to 10,000, 2d. per unit, with the addition of the coal clause, *plus* 13½ p.ct. The Hove Corporation have raised their prices for power purposes to 3d. The Bingley Town Council have increased the price for heating and for the smaller power uses by 1d., and for large power uses by ½d. The new prices for power are interesting in view of the figures which we quoted last week from Prof. Burstall as to the costs of a B.H.P.-hour by gas-engine working. At 3d. per unit with an electric-motor, a B.H.P.-hour would cost for current no less than 2·46d., while the figures given by Prof. Burstall for gas-engines included all costs—capital and working.

Current Limiters and Financial Risks.

The costs of installation in the case of electricity are a splendid incentive to electrical men to seek ways and means of wriggling away from them. They know that the most logical method of charging for current is by a definite rate for every unit supplied. But this means a meter; and wiring and fittings *plus* a meter put electricity so often out of court, and gas steps in and secures the business. This bare acknowledgment by an electrician is a confession of electrical costliness. Mr. E. H. Miller makes the confession in an article in the "Electrician," in which he submits the expediency of charging on a flat-rate per week by installing a reliable current limiter (instead of a meter) to prevent consumers using more than their fair share of current. The cost of a limiter is less than that of a meter. Then the cute Mr. Miller suggests that the electricity suppliers should arrange with house agents to collect a certain definite sum, which the consumer will pay as part of his rent on weekly or monthly instalments—so avoiding the expense on the part of the electricity suppliers of keeping records, meter reading, and the rendering and collection of accounts. The proposal to hide the electricity charge away in the rent is an artful one, and landlords will not be very willing to oblige, seeing that tenants are now grumbling furiously (without a charge for electricity) over the heights to which rents have soared in these difficult times. To the objection that the limiter system offers no protection against the consumer using the current continuously, Mr. Miller replies that lamps have only a certain life; and if used in this way, the consumer will soon have to replace them. Dealing with the financial aspect, Mr. Miller says:

> Assuming that we have to deal with a block of 500 houses, that an average of 1s. 6d. per week per house is charged, and that the limiters are set to allow 100 watts per house, we have a revenue of £1950 per annum, and a possible demand of 50 KW., or equivalent to (say) £39 per KW. of demand per annum. The figures taken in this instance are not unreasonable, as they have been adopted by at least one corporation in this country; and it will be conceded that they are well above the average obtained. Moreover, assuming that each of the 500 houses uses 100 watts for twenty-four hours every day, all the year round—an obviously impossible contingency—then the revenue is 1·068d. per unit. It is safe to assume that on the average not more than four hours' use per day at the rate of 100 watts of maximum demand will be made, thus raising the price received per unit to 6·41d.—a most acceptable figure when the additional saving referred to in a previous paragraph is taken into consideration.

The foregoing shows the financial risks there are in the business. Moreover, it seems to us that the average revenue will not be fair to consumers who are paying more *for current only?* As a rule, electricity consumers have to pay rent for meters, so that the capital charges are, or should be, covered. Meters enable business to be placed on a sound and equitable basis; all these freakish expedients of the electricity people have the opposite effect. The article describes the Ediswan current limiter device, designed by Messrs. J. Cleary and J. H. Philpot, of the Brighton Electricity Department. Perhaps this fact will enable one to "place" the anonymous corporation spoken of in the quoted paragraph.

Meter Lubricating.—Patent rights have, says the "Gas Record," been granted to the Chicago Gas-Meter Lubricator Company for a device for lubricating meter leathers while in use. It consists of a metal oil-container, from which two wicks are led through tubes to impinge lightly upon the meter leathers each time they expand and contract. Capillary attraction draws the oil from the container, and spreads it throughout the leather. In a test conducted over a period of 77 days, the amount of oil consumed was 361 grams. At this rate, a container would supply oil for 2 years 8½ months. The rate of flow can be regulated; and in practice it would be necessary, it is claimed, to use but half the above amount of oil. So that a meter thus equipped would be constantly lubricated for a period of nearly six years. The tests also included an effort to determine the tendency of oil to spread throughout the whole area of leathers. To do this, a piece of leather was washed in gasoline, dried, and placed under the oiler. It was found that the oil spreads in all directions, and thoroughly permeates the leather.

INSTITUTION OF GAS ENGINEERS.

Council Meeting.

A MEETING of the Council was held at No. 30, Grosvenor Gardens, Westminster, on June 30. The chair was occupied by Mr. THOMAS HARDIE (Senior Vice-president) in the unavoidable absence of the President, Mr. Thomas Goulden.

ANNUAL MEETING.

It was decided that the Annual Meeting of the Institution, which had been postponed from May 24, should take place on Tuesday, Oct. 11, and the three following days, subject to that date being convenient to the Société Technique de l'Industrie du Gaz en France, who are expected then to pay their postponed visit.

MEMBERSHIP ROLL.

After the usual preliminary business, the following candidates for membership were, upon the recommendation of the Emergency Committee, approved: For the class of member—Leslie J. Blackburn, of Hong Kong; W. E. Harris, of Swindon; C. J. Johnston, of Dannevirke (N.Z.); T. M. MacDougall, of Melton Mowbray; James M'Luskv, of Calverley and Horsforth; Samuel Moore, of Scunthorpe; Ewart F. Smallbone, of Broadstairs; Sidney Smith, of Bristol. For the class of associate member—Frank A. Jenkins, of Leamington; Arthur Marsden, of Bristol; John Wilson, of Bristol. For the class of associate—Walter T. Dunn, M.I.Mech.E., Secretary of the Institution; Albert Parker, D.Sc., Research Chemist to the Institution; James W. Wood, M.Sc., Technical Research Chemist to the Gas Investigation Committee of the Institution. For transference from the class of associate member to that of member—Henry L. Bateman, of Wakefield; John T. Joyce, of Weymouth; and Ernest Scears, of Redhill.

It was resolved that Mr. Thomas Settle be nominated for election as an honorary member of the Institution.

BIRMINGHAM MEDAL AND MEDALS FOR PAPERS.

It was decided to give consideration next year to the question of awarding the "Birmingham Medal."

The question was discussed as to whether the awarding of the medals for papers presented to the Institution should be resumed. These awards have been discontinued during the war; the last award having reference to the papers read in the year 1913, when the Institution met in Glasgow.

AN ASSISTANT EXAMINER.

Correspondence which had passed between Mr. Tagg, the Examiner in Gas Engineering and the City and Guilds of London Institute, was reported, with reference to the desirability of appointing an Assistant Examiner, having regard to the increase in the number of candidates which had risen in consequence of the restoration of the examinations in the lower grades.

PREPARING CANDIDATES FOR EXAMINATION.

A communication was received from the Board of Education giving permission to the City and Guilds of London Institute to hold in 1922 their Grade I examination in "Gas Engineering" and in "Gas Supply," and the Grade II examination in "Gas Fitting."

Mr. H. Kendrick, the Examiner in "Gas Supply," reported correspondence which had passed between himself and the City and Guilds of London Institute in regard to the results of the recent examinations; and it was resolved that the information be communicated to the Technical Press. It was as follows:

Mr. Kendrick advises that the lecturers at the various technical schools should pay some attention to the preparation of sketching, as from this an examiner can obtain a clearer insight into a student's knowledge than is often possible from a mere description, and it is a useful accomplishment for anyone seeking promotion in the supply department of a gas undertaking. With the exception of a very limited number, the sketching of the candidates has been very poor, and leads one to doubt the meaning of a great deal of the written matter.

Mr. Kendrick points out, further, that many candidates are also lacking in descriptive power, and that their answers were in a considerable number of papers so vague and lacking in essential detail as to make it impossible for an examiner to judge correctly of the candidate's knowledge, and that they may have been marked lower than they were really entitled to in consequence of this. On the other hand, many have introduced into their answers so much writing as to lead one to think they were writing an essay. The result of this was that they did not have time to answer the eight questions they were entitled to answer, and some papers of great promise could not be marked up sufficiently to warrant a first-class pass. A few even did not obtain a "pass" because of being too wordy.

The papers in Grade I bore evidence of being unbalanced; the greater proportion of the students concentrating on about three or four questions, while other questions, just as essential for an all-round man to answer, had been more or less neglected. The subjects requiring special attention are those connected with mains, internal piping, burner efficiencies, lamps, and industrial furnaces.

In the Final Grade, the papers show a much more satisfactory level of knowledge; but the subjects there requiring special attention at the schools are mains, high-pressure lighting, street lighting, and industrial furnaces.

Mr. Kendrick suggests that the attention of lecturers should be called to the above points, and particularly to the lack of knowledge of mains, pipes, and laying, the answers generally to the questions relating to them being exceedingly poor.

THANKS TO THE GAS LIGHT AND COKE COMPANY.

A cordial vote of thanks was passed to the Directors of the Gas Light and Coke Company for their kindness in providing temporary office accommodation for the Institution since the offices in Victoria Street were vacated. It was reported that the Institution hoped to move into its offices at No. 30, Grosvenor Gardens, which were still occupied by the United States Navy Department, during the next few weeks.

INTERNATIONAL COMMISSION ON ILLUMINATION.

Mr. Robert Watson, one of the representatives of the Institution on the National Illumination Committee of Great Britain, affiliated to the International Commission on Illumination, was appointed to represent the Institution at a conference of the Commission taking place in Paris from July 5 to 8.

CORBET WOODALL SCHOLARSHIP.

A report was received from Prof. Cobb to the effect that, in response to the advertisement which had appeared in the Technical Press in regard to the Corbet Woodall Scholarship, no applications had been received which would justify the Committee in appointing a scholar to succeed Mr. Leslie Ingram, whose term as Corbet Woodall Scholar expired this year.

It was decided that another advertisement should be inserted towards the beginning of next session in October, with a view to the Committee having the matter in hand recommending to the Senate of the University a candidate who might be found suitable.

FIFTY YEARS' SERVICE.

With reference to Mr. Samuel Glover's completion of fifty years' service at St. Helens, the following resolution was unanimously passed:

> That the sincere congratulations of the Institution of Gas Engineers be tendered to Samuel Glover, Esq., M.Inst.C.E., F.R.M.S., President of the Institution for the year 1918-1919, on his attainment, on 1st May, 1921, of fifty years' continuous service in the Gas Department of the Corporation of St. Helens, Lancs., and in the St. Helens Gas Company, as Pupil, Assistant, Deputy Engineer, and Chief.
>
> The Council desire to record their appreciation of Mr. Glover's unceasing efforts on behalf of the Institution, and in the promotion of the interests of the gas industry generally, especially in the important detail of carbonization. The services he rendered to various Government Departments during the Great War, and also since the declaration of the Armistice on the 11th November, 1918, will always be remembered with satisfaction.
>
> The Council express the hope that, in his retirement from the position of Engineer and General Manager at St. Helens, Mr. Glover may long be blessed with good health, and retain the close friendship of his colleagues, who take this opportunity of expressing their sense of his genial characteristics and professional attainments.

THERMAL EFFICIENCY.

In regard to the exhibition of diagrams and models in connection with the conference on "The Means of Increasing the Thermal Efficiency of Heat Power Plants" arranged by the Institution of Mechanical Engineers, it was reported that the Institution of Gas Engineers had assisted in this exhibition by contributing a large-scale diagram of the table in the "Note on the Thermal Efficiency of the Generation and Use of Gas and Electricity" by Sir Dugald Clerk, K.B.E., which had appeared in the Transactions of the Institution of Electrical Engineers; and also a series of small specimens of coke produced from a special electric testing furnace, the invention of Dr. Lessing. [The large diagram shows graphically the relative efficiencies of gas and electricity, and indicates how, by the carbonization of coal at gas-works, the greatest coal conservation is obtained. The diagram can be borrowed by any member of the Institution desiring it for lecture illustration, on application to the Secretary].

SCUNTHORPE CARBONIZING PLANT.

The following resolution passed by the Urban District Council of Scunthorpe and Frodingham, with reference to a suggested investigation on the carbonization plant at Scunthorpe, was communicated to the Council: "Resolved that permission be given to the carrying-out of the desired investigation, subject to the Institution of Gas Engineers bearing any expenses in the matter and subject also to the Institution furnishing to the Council gratis full particulars of any such investigation."

The Council decided that the matter should be referred to the Research Sub-Committee of the Gas Investigation Committee.

PAYMENT CLAUSE OF THE STANDARD CONDITIONS OF CONTRACT.

A communication was reported from the Society of British Gas Industries agreeing to the Institution's suggestions with reference to the question of revising the payment clause of the Standard Conditions of Contract, which has been raised by the Society.

The clause as now revised reads as follows:

> The contractor shall be paid as soon as possible, and in any case within one month after the expiration of each month from the first instalment becoming due, a sum equivalent to 85 p.ct. of the

value of the contract materials delivered, and permanent work executed on the site during the preceding month, as certified by the engineer.

When the work is completed ready to be put into operation to the satisfaction of the engineer, a further payment equivalent to 5 p.ct. of the total amount of the contract shall then be due, and shall be made within the month next following the date of the demand made in writing by the contractor for the said payment.

The balance of 10 p.ct. of the total amount of the contract, and any balance that may then be outstanding, shall be due . . . months after the date on which the previous payment became due and shall be paid within one month after the said balance became due, provided the work be then satisfactory.

Payments for any extras or for any work arising out of the contract shall be made as far as possible in accordance with the foregoing provisions.

Any instalments not paid within one month of becoming due shall bear interest at the rate of 6 p.ct. per annum from the date when the said instalments did become due, and for so long as they shall remain unpaid.

Any retention money that may be held for a period exceeding . . . months shall bear interest at the rate of 6 p.ct. per annum from the date at which such retention money would have been due had it only been retained for . . . months, until such time as payment of it shall be made.

Any interest that may have accrued on any monies or instalments shall be paid at the same time as the principal sums."

FINANCE AND EMERGENCY COMMITTEES' REPORTS.

The reports of the Finance Committee and the Emergency Committee were presented, accepted, and adopted.

COKE AND BYE-PRODUCT WORKS CHEMISTRY.*

[Review by D. V. HOLLINGWORTH, F.I.C., F.C.S.]

THE magnitude of the coke and bye-product industry and its comparative youth, the highly scientific nature of its processes, and the important recent developments in them, provide an unexampled opportunity for the production of a really comprehensive work dealing with the chemical and physical methods of control employed in the industry. In the recently published book on the subject by Mr. T. Biddulph Smith, it cannot truthfully be said that the author has made the most of the opportunity presented to him, nor indeed has he fulfilled the intention expressed in the preface—of furnishing a concise manual covering the general work required for the chemical control of such plants.

The preface itself is not beyond criticism, as it is certainly not correct to say that no books are obtainable for the guidance of officials of the coking industry except such as are written for the gas industry, as witness the useful work by Messrs. Christopher and Byrom, the third edition of which was recently reviewed in these columns.

By far the most valuable and important sections of the book, and, in fact, the only ones which justify its publication, are those devoted to the excellent work of Messrs. Colman and Yeoman, on methods for the analysis of crude benzoles, and of Messrs. Spielmann and Wheeler, Spielmann and Jones, and Northall-Lawrie on similar subjects, and of Mr. Linder on methods of analysis of ammoniacal liquor. More than one-half of the 162 pages comprising the book is occupied by the work of these authors, which has of course been previously published elsewhere. With respect to the chapters compiled by Mr. Smith, they contain little that is new, and omit much that could with advantage have been included.

In the opening chapter, the tests on coal and coke have not been treated with sufficient detail, the most accurate methods have not always been chosen, and certain indispensable tests have been omitted—for example, Kjeldahl's method as given is not now considered accurate enough for the estimation of nitrogen in coal and coke (some modification of Dumas' combustion method being usually employed), and methods for the analysis of coal ash, for the estimation of sodium chloride in coal, and for ascertaining the hardness of coke, have been left out altogether. Further, methods for the proximate analysis of coal only are given, whereas in a work of this kind the inclusion of a description of the means adopted to ascertain the elementary composition of coal would have been an improvement.

There are other notable omissions from the book—such as methods for the analysis of lime, soda, and muriate of ammonia, and for the estimation of tarry matter in sulphate of ammonia. In view of modern developments in the construction of carbonizing chambers, it is surprising that the important subject of the analysis of refractory materials is left entirely untouched.

The tests given for determining the quality of pure naphthalene, pyridine, and cresols are not by any means complete. As to pyridine, its reactions with cadmium chloride, Nessler's reagent, and the titration tests, are not to be found in the book. As to the cresols, the nitrification of meta-cresol is missing; and as to pure naphthalene, no methods are offered to demonstrate the degree of rectification to which it has been submitted—*i.e.*, the colour test, its behaviour with acids, &c.

On page 44 it is stated that, with a little practice, determinations of the melting point of naphthalene can be made to within $\frac{1}{2}$° C. Those actually connected with the manufacture of pure naphthalene will know that much greater accuracy than this is required. There is no difficulty in reading to $\frac{1}{2}$° C.; the difficulty arises when one has to read (as frequently happens) to $\frac{1}{10}$° C.

The utility of the book is much reduced by the almost complete absence of copies of the standard specifications under which certain coal-tar products are bought and sold. The Engineering Standards Specification for creosote, that of the National Benzole Association for benzole, that of the Road Board for prepared tars, and the customary old and new specifications for pyridine, with the methods of testing these materials described therein, should surely have been referred to.

On the first page of chapter 4, Mr. Smith has been very unfortunate; the faulty spelling of ortho-cresol being repeated in several places. On the same page, also, xylols are several times referred to where xylenols are obviously meant. There may not be much difference in the spelling of the names of these bodies, but there is a tremendous difference in their properties.

In the chapters relating to gas analysis, several well-known methods are described—such as those of Hempel, Orsat, &c. The determination of benzole and its homologues in gas is treated very fully; the customary methods, as well as those of Lessing, Burrell and Robertson, and Sainte-Claire Deville, being described. With respect to the latter, Mr. Smith says he has slightly modified the test to give good results. It would have been interesting to have had the modification described, so that one could have seen exactly how much of the method is due to M. Sainte-Claire Deville and how much to Mr. Smith.

In an appendix to the volume, Dr. Spielmann contributes an excellent account (previously published under the auspices of the Ministry of Munitions) of some of the constituents of coal tar. This will be of the greatest service to chemists generally. It is satisfactory to note that Dr. Spielmann throughout this description uses the terminal "e" in the spelling of benzole, toluole, and xylole, although in the rest of the book it is everywhere omitted.

In a second appendix are given the usual tables relating to the preparation of standard solutions, &c.

* "Coke-Oven and Bye-Products Works Chemistry." By T. Biddulph Smith. London: Charles Griffin and Co., Ltd.; 1921.

Cleaning the Fires of Water-Gas Sets.

In a paper submitted to the Southern Gas Association of America, Mr. J. H. Taussig, of Philadelphia, when dealing with the subject of increased output, enumerated the fundamentals affecting the capacity of water-gas sets. One of these is proper attention to the fires. He pointed out that it is necessary, in order to get high capacities, as a rule, to clean frequently and thoroughly. With coke-fires he recommends six to eight hours between cleanings as the best periods. With anthracite coal, this time can be extended in sets which have a deep fuel bed. In general, however, it will pay to clean every eight hours. With coke having a low fusing-point in ash, methods have been devised for handling this type of clinker. The best of these is the hold-up bar system. Large doors are provided on both sides of the generator. The set is operated to melt the clinker into a slab on the grate. The hold-up bars are then pushed over the clinker, and supported on the doors. These bars cover the entire inside area of the generator. The clinker is next broken up with large bars, and taken out through the doors. In this way the clinker under the bars is removed. As a rule, no barring-down of the fire is required with this method of cleaning. As already stated, the set is operated by adopting a proper percentage of down-runs to melt the clinker on to the grate. With anthracite coal, and some of the coals having very high-fusing ashes, the clinker arches-over sufficiently to allow the fires to be cleaned without the use of hold-up bars. However, this type of ash collects on the side walls of the generator, and must be barred-down from above. Various mechanical devices have been made for barring this clinker off the walls. Most of these consist of a small hoisting engine, which lifts and lets fall a heavy bar over the clinker. This bar usually weighs from 400 lbs. to 600 lbs., and very quickly removes the side-wall clinker, with slight effort on the part of the operators. In this way time is saved on each cleaning.

Coal Prices.—A meeting of coalowners from Lancashire, Yorkshire, Derbyshire, Nottinghamshire, and Leicestershire has decided that, to maintain an average selling price of coal at a figure which would cover the cost of production, and having regard to the depreciated value of slack as compared with the prices in operation before Government control, an advance of 3s. per ton be made in gas coal and house coal above the prices in operation before the stoppage.

Erection of the Auckland Gas-Works.—When recording, on p. 607 of the "JOURNAL" for June 15, the death of Henry Atkinson, it was stated that he arrived in New Zealand in 1863 to supervise the erection of plant for the Auckland Gas Company. Referring to the matter, Mr. William Wark has written as follows to a local paper: "My father, I. N. Wark, was engaged in England, and came to Auckland in 1861 to erect the works, and subsequently was Manager and Secretary for some years. On his appointment as Engineer to the Australian Gaslight Company, Sydney, and on his recommendation, Mr. Atkinson was appointed Manager, a position he long held with credit to himself and advantage to the Company."

CENTENARY OF THE IPSWICH GAS COMPANY.

CELEBRATING THE EVENT.

ANOTHER centenary of a gas undertaking! These interesting events may be expected to come along with greater frequency now; but there are some, and will be some, that have greater interest than others. The Ipswich Gas Company is one of these, through personal association and pioneering work. The day on which the first Act was passed incorporating the Company was May 28, 1821; yet it was three or four years before that when private enterprise gave Ipswich its first supply of gas. But May 28, 1821, may be taken as the natal day of the present Company; and the completion of a hundred years' honest and good service to the borough was celebrated last Saturday. It was a simple function, yet grand in its conception and its carrying out. It was entirely a domestic affair, to which a few friends were invited to come and rejoice with those whose combined labours are carrying on the service to-day. We can think of no more fitting manner of celebrating a birthday of such a piece of commercial enterprise than by Chairman, Directors, chief officials, staff, and workers—all those whose united efforts produce successful issues—assembling together with wives or sweethearts, and spending the time in recreation, with an interval for tea and a little speech-making. This was how the Ipswich Gas Company kept their birthday. The scene of the day's events was the beautiful home—Oak Hill—of the Chairman, the Right Hon. Sir Daniel F. Goddard. The setting of the house, which was built by Mr. Ebenezer Goddard away back in the early sixties, and extended by Sir Daniel, is one which for natural picturesqueness could hardly be surpassed. Over the beautiful scene on Saturday was a clear sky; Old Sol was demonstrating his thermal value in a manner which testified to his ardent good wishes; and he made that which was beautiful more so by intensifying the brilliance and causing the trees on this well-wooded sloping land to cast refreshing shade.

Sir Daniel and Lady Goddard received their guests at a small tent on the terrace lawns. Their delight required no words to give it expression. On the faces of both there was welcome for all, which the shake of the hand and the word simply intensified. It was a time of happiness; and it seemed quite natural that this birthday should be spent at the home of the Goddard family, for the destinies of the Ipswich Gas Company have been largely in their hands during best part of a century, and without a single break in the continuity, as will be seen later. All were glad to be there; and the freedom enjoyed in rambling about the place at will was much appreciated. Wherever one walked, somewhere or other were found host and hostess among fresh guests. Beautiful appropriate music floated through the grounds from the band of the Suffolk Yeomanry situated among the trees lower down the grounds; and when the band was not playing, music came from that wonderful new instrument which will become better known with passing time as the "Magnavox," or the music and voice "telemegaphone." They look terrible words; but an analysis of them will explain the objects and capabilities of the instrument, the only representative of which at present in the country is the one seen and heard on Saturday. The musical selections given by it were under the direction of Mr. Laurence Parker. The carrying power of the instrument was proved by both the music and the voice of Sir Daniel.

With music in our ears, we wandered about the charming place. From the terrace very fine views are obtained. We glance through beautifully wooded glades; and in the background there is the broad Orwell, glistening with the sunlight on the ripples, and the sailing boats moving idly along. It is a holiday; and the Orwell and its life seem in harmony. We pass over a rustic footbridge which crosses a small ravine, with water trickling along at the base, and the deep rockwork sides covered with palms, ferns, and floral growths made choice and beautiful by their congenial surroundings. Here we come on to the tennis courts, where employees of the Company are playing-off their finals in the mixed doubles, and in the gentlemen's singles. Here, too, were in the afternoon played the semi-finals and final in the bowls tournament; and in the meadow beyond the pleasant vegetable and fruit gardens, the teams of three a side were deciding quoit events. The Chairman, Directors, staff, and employees generally with their lady folk were out for pleasure, and they enjoyed it to the full. The writer met Sir Daniel again on the rustic bridge by the tennis courts; and the former was not long in discovering that the latter, as an employer, is a strong believer in the cohesive virtues of pastimes among employees. They create a bond of friendship and good rivalry which has in it permanent good. Moreover, it is his nature to take a pride in the abilities of the Company's employees on the tennis courts and on the sports ground generally. Though there were 500 and more visitors here, Sir Daniel seemed to know most of them. In short, to the observer it appeared to be one big family gathering. There were the Directors, here and there; there was Mr. Frank Prentice, the Engineer, and Mr. G. A. Mallett, the Secretary, as busy looking after the affairs of the day with the same concern for the details as though it was all part and parcel of their daily work. Among other friends whom one met in the grounds were the President of the Institution of Gas Engineers (Mr. Thomas Goulden) and his wife. Sir Daniel is, besides being an old friend of the President, one of the Directors of the Gas Light and Coke Company; and Mr. and Mrs. Goulden could not resist the invitation to share in the day's pleasures. They, like the rest of the few visitors who could not claim direct association with the Ipswich Company, were charmed and delighted, and found in everything the best of auguries for a continuation of that wise management and work which has made the Company the success it has been during the century, and which, when supplemented by an easing of the (we hope) temporary bad economic conditions of the present, will inaugurate the second century's work with the most genuine promise.

Tea and Speeches.

In a marquee in the paddock—the seating capacity of the marquee being some 550—the big company, with the spirit of the occasion upon them, sat down to high tea at 5.30. On a slightly raised platform at one side, Sir Daniel and Lady Goddard sat with their personal guests. Among them were Mr. and Mrs. Goulden, the Deputy-Mayor of Ipswich (Mr. F. E. Rands) and Mrs. Rands, four of the Directors—Messrs. Hugh Turner, H. Miller, M.Inst.C.E., F. Corder, and G. H. Hewetson (Mr. F. Fosdick, Vice-Chairman, was absent through indisposition)—Mr. S. A. Notcutt (Solicitor), Mr. T. E. Mayhew (one of the Auditors), Mr. F. Prentice (Engineer and Manager), Mr. G. A. Mallett (Secretary), Mr. C. E. Wright (Assistant Engineer), Mr. E. Young Harrison, M.Inst.C.E. (Borough Engineer), Mr. E. C. Sayer (Gas Examiner), Mr. C. W. S. Oldham (Water Engineer), Mr. J. S. Garrard (Secretary of the Eastbourne Gas Company, and a former official at Ipswich).

Radiating at right angles from the top table were the tables at which sat the employees of the Company, with wives and sweethearts. Pleasure dominated. We all enjoyed the tea, for the afternoon had sharpened the appetite, and the provision was all inviting. After tea there were some speeches, preceded by one disappointment. There was no Mayor of Ipswich present; and his Worship (Mr. Frank Mason, J.P., M.B.E.) had been expected to propose the toast of the afternoon. Indisposition, however, had necessitated a change elsewhere. But there was compensation in the geniality of the Chairman in conducting the speech-making part of the programme, in the presence of the Deputy-Mayor, and in the letter which the Mayor had sent, and which was read in lieu of his speech. Before this was done, however, Sir Daniel read an apposite telegram he had received from Mr. Mason.

> Heartiest congratulations. Trust new century on therms will be as successful as last century on cubic feet.

The reading of this was met with applause. Then Sir Daniel, having mentioned that those present were assembled to celebrate the hundredth year of their existence as a statutory Company, read the following

MESSAGE FROM THE MAYOR.

Town Hall, Ipswich,
July 7, 1921.

Dear Sir Daniel,—I am extremely sorry that I shall be unable to be with you on Saturday next, at the celebration of the Centenary of the Ipswich Gas Light Company—an auspicious occasion in the history of this borough.

It is interesting to look back to 1821, and to see from what small beginnings has grown the magnificent commercial and engineering undertaking now represented by the Ipswich Gas-Works; and it is very gratifying to think that, throughout the hundred years this undertaking has been essentially the work and property of Ipswich men—the roll including such well-known Ipswich names as Ransome, Corder, Cobbold, Jackaman, and last, but not least, the name of Goddard. I am sure the undertaking is exceptionally well-placed in having as its present head a gentleman whose father and grandfather were associated with it, and who has himself been right through the undertaking from bottom to top, and whose fame as a gas engineer has spread widely.

In these days of labour troubles, we find some undertakings booming the fact that they are instituting co-partnership systems. The Ipswich Gas-Works have instituted and worked such a system for some years; and I know very well how happy and amicable are the relations which exist between the Company and their employees. I hope that these relations will long continue, and that the Ipswich Gas-Works may continue to lead the way in sharing their prosperity with their workers, which not only is for the good of the Company and their workmen, but also for the benefit of this good old town.

I hope that you will all have a most enjoyable time on Saturday.—I am, Yours faithfully,

FRANK MASON, Mayor of Ipswich.

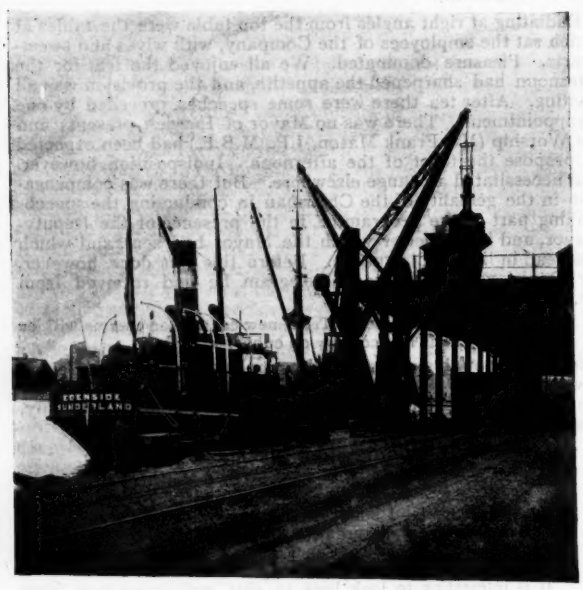
The Rt. Hon. Sir Daniel Goddard,
Oak Hill, Ipswich.

When Sir Daniel came to the personal part of the message, he remarked, amid laughter, that he thought he ought to have asked the Secretary to read it. However, no one noticed his blushes. The message ended, the Chairman called upon the President of the Institution of Gas Engineers.

THE PRESIDENT AND THE HISTORY OF GAS LIGHTING.

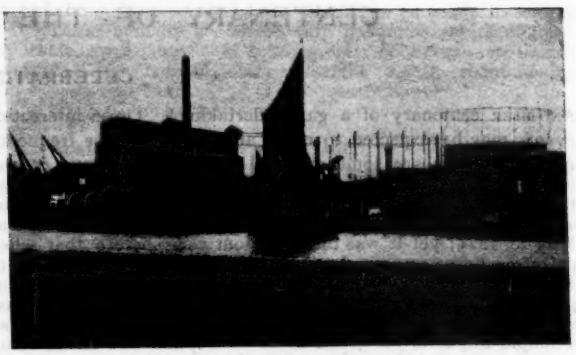
MR. THOMAS GOULDEN, in the course of his remarks, said this was an important occasion. He thought it was rare in the history of any

industry that one undertaking could be carried on consecutively and in the consistently progressive manner that this undertaking had been throughout the long period of one hundred years. A hundred years was a long time upon which to look back. He supposed before a hundred years ago the only existing public service was that of water supply; so that the service of gas was, next to water, the oldest public service in the country. It had been carried on for the benefit of the community throughout this long period; and, after a hundred years, one might begin to think that the industry might be pardoned for showing some signs of decay. Not only was this not the case, but it was more vigorous, and he thought was likely to be more vigorous still in the future than it had been in the past. Mr. Goulden traced the early history of gas lighting. And, incidentally, he made the point that the first occasion on which gas lighting was brought at all prominently to the notice of the public was, oddly enough, to celebrate the Peace of Amiens in 1802. It was therefore peculiarly interesting that the beginnings of the century of gas was at the time of recovery from a great Napoleonic war, and that we should be celebrating about 100 years after what he hoped was the beginning of the recovery from a war which had wrought such havoc all over the world, and which all hoped was the last big war. The narrative went on until the President told of the founding of the old Chartered Gas Company, which, by a series of amalgamations, eventually became the Gas Light and Coke Company, of which he had the honour to be the Engineer. The old Company started making gas in 1810, and received the Charter of Incorporation in 1812; so that they by just a little ante-dated the Ipswich Gas Light Company. The history of the Ipswich Company was a continued record of progress; and it must be a source of justifiable pride to Sir Daniel to be presiding at this great gathering that day to celebrate the foundation of the Company. Looking back over these years of beneficial work, Sir Daniel knew that practically the history of the Ipswich Gas Company was the history of himself, his father, and his grandfather, Mr. Goulden went on to refer to coal, and its origin; and he pointed out how coal had been the



Coal Discharging Wharf—Ipswich Gas-Works.

fostering medium in the world's development. Coal is our capital, invested for us by Nature. It had to be used—not wasted. It was, he said, his particular pride to be associated with an industry in which coal was used carefully and not wasted. By its processes the gas industry realized 75 p.ct. of the heat energy in coal; and this was an important thing. Theirs was one of the very few industries that could realize anything like this. Their rivals in the electricity industry could not do anything like it. Under favourable conditions, they could reach to about 12 p.ct. The gas industry was improving its methods. The Ipswich Gas Company had improved their methods. They had absolutely one of the most up-to-date plants in the country, which was using this natural treasure in the most economical way. Not only did they develop heat which brought comfort and cleanliness to their homes, and helped their industries, but their work contributed to health, to the production of fertilizers, motor spirit, and other things which were required for the maintenance of a large number of industries. This was all done in times of peace; but not so long past they were producing the materials for carrying on the great war. He quoted the appreciation made by Lord Moulton of the industry's work in the war—work in which the Ipswich Company took good part. To him it was a great thing to belong to such an industry. What, too, the industry gave of its manhood all knew. He had said earlier it must be a source of justifiable pride to Sir Daniel to be presiding at this gathering after a hundred years of service. Sir Daniel's grandfather was one of the first organizers of the Company; and it was only a few years old before he became Engineer. The manner in which the works were started was a tremendous asset in its position to-day. The site down by the river was the best possible position in which the works could have been placed. It was a lasting tribute to the wisdom of the Company's earlier administrators to have put the works where they were. This was one of the reasons why the capital of the Company per 1000 c.ft. or per therm was one of the lowest in the kingdom. It was a tremendous asset in the prosperity of the Company. Sir Daniel's



General View of the Ipswich Gas-Works.

father (whom he had the privilege of knowing) followed in the same manner. The works grew consistently; and he was one of the first men in the country who saw what a future gas had for cooking and heating. What Sir Daniel had done in the industry he need not speak of in that assembly. But, in addition to the esteem in which they held him as an administrator of the undertaking, there was the esteem in which his fellow-citizens held him, which was shown by their having elected him to represent them in the House of Commons for so many years. It must have caused great regret to a large circle of friends and acquaintances, and to every citizen of the town, when, at the redistribution of seats which gave Ipswich a member less, Sir Daniel retired. But before he retired, they were all glad to know he was honoured by His Majesty, who first conferred upon him a knighthood, and later the honour of being made a member of the Privy Council. As Engineer of the Gas Light and Coke Company, he could say they welcomed Sir Daniel's presence at their Board. He had an extended experience of the work of a gas company from bottom to top, and this was a great asset in running a very much larger undertaking. In very big undertakings it was a most difficult thing to get into touch with all the details; and it was a great advantage that Sir Daniel had obtained his experience in works of medium size, because it made him an expert in all matters connected with gas. In conclusion, he asked those present to drink to the prosperity of the Ipswich Gas Company; and he coupled with the toast the much loved and respected name of Sir Daniel Goddard. [Cheers.]

The Thanks of the Borough.

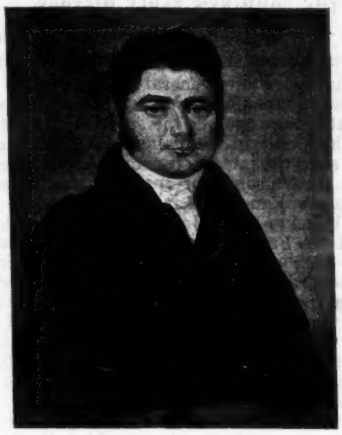
Mr. F. E. Rands (Deputy-Mayor) said the Mayor had asked him to express the great regret he felt at being prevented from being present. The Mayor had been working well and hard; and his medical adviser had suggested that he should go away for a few days. Had his Worship been present, he would have congratulated the Company upon celebrating their centenary and upon the great public service they had rendered to Ipswich. It was quite possible there were a large number of citizens of Ipswich who did not recognize the public service that the Company rendered. This was because they had come into the world since gas was introduced; and so did not realize—or did not until a week or two ago, when they had to go short—what a muddle they would be in without it. He ventured to express, on behalf of the borough, the great indebtedness of the people for the services the Company had rendered, and to congratulate them upon their success. He did not know of an industry that, or a housekeeper in Ipswich who, could do without gas. While they had such men as Sir Daniel at the head of the concern, everything would be done to maintain its progressive policy. The Company, too, had set a splendid example in the matter of co-partnership and the relations existing between employers and employees. [Applause.]

Revision of a Superannuation Condition, and Higher Co-Partnership Bonus.

The Chairman (who again spoke through the "Magnavox") thanked the President of the Institution of Gas Engineers, on behalf of all present, for coming down, and speaking such words of experience, interest, and help. He was also much obliged to Mr. Rands, the Deputy-Mayor, for his kindly words on behalf of the borough. He need not dwell upon the history of the Company, because their Secretary had written a most helpful brochure which recounted some of the main facts. He should, however, like to say a few words as to the

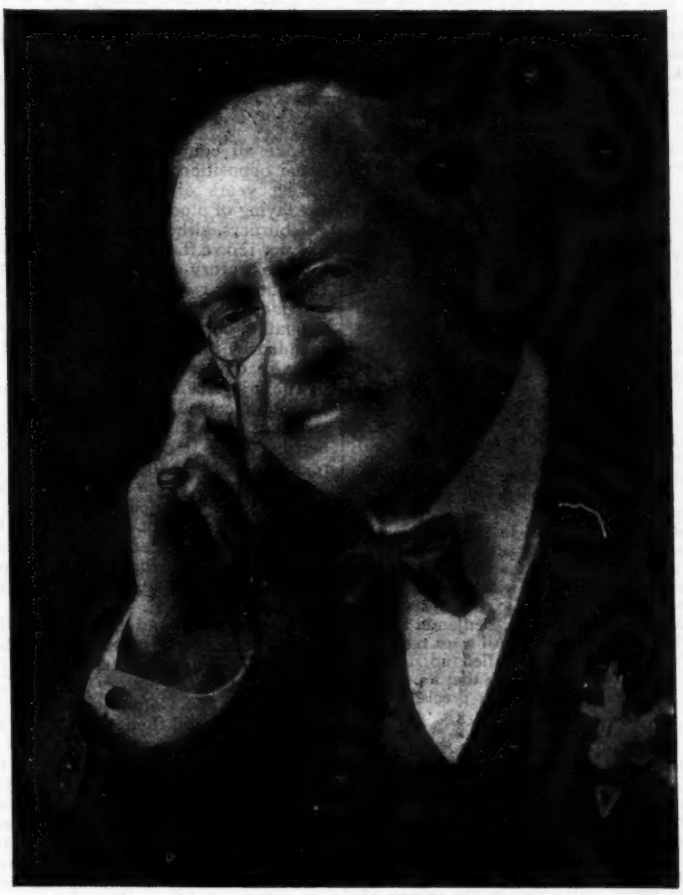
No. 1 Retort-House—Ipswich Gas-Works.

PAST AND PRESENT OFFICIALS OF THE IPSWICH GAS COMPANY.



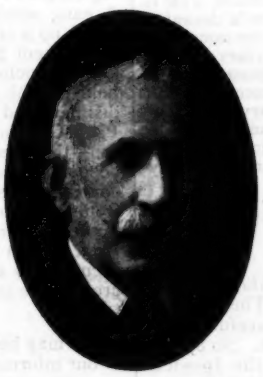
MR. DANIEL POOLE GODDARD.

MR. EBENEZER GODDARD.



THE RT. HON. SIR DANIEL FORD GODDARD, J.P.

MR. FRANK PRENTICE.



MR. J. T. JOLLIFFE.

MR. G. A. MALLETT.

future. Their Company was what was called a public utility company; and it had carried on without interruption its useful work until, after eleven weeks of the coal strike, they had during the succeeding fortnight to diminish the supply. With all the efforts of their Engineer and Manager and his staff [cheers], the only coal they could obtain was of foreign origin. It was very difficult to get; and when they did get it, it was not worth much. The great national disaster had shown them that in the Company they had a body of men who had proved themselves loyal and indefatigable in overcoming the difficulties with which they had been confronted. It had meant extra work, hard work, and exhausting work; but he was proud to be able to say their men had never flinched from doing it. He thanked them for the splendid way they had stood by the Company during the strike. There was only one way to make the Company as successful during the next hundred years as it had been during the past century. This way was to work together in a spirit of unity and mutual good feeling. He said deliberately that the duty of the management was to look after the employees, to pay a fair wage, and to treat them as they were treating them at present. He had in this connection one or two announcements to make. They had a superannuation fund. One of the rules of this was that, if a man did not call upon the fund, and received no benefit from it, at his death his widow and family received the money he had paid into it during his lifetime. The Directors did not consider this was enough. They had therefore decided that in future the rule should be revised, so that double the amount that had been paid in by a man should be received by his family. [Applause.] But if the management looked after the employee, the employee must be loyal and give of his best work; and there never was a time more than now when they wanted the best work from the men. The talk about capitalists was "all rot." They must have capital to carry on industry. There were 165 of their employees who were capitalists in the Company to-day; and they held over £2000 worth of stock. He believed that the best solution of many of the industrial problems of the present day was to be found in the principle of co-partnership, whereby both employers and employed shared in the profits of the working. Co-partnership on the material side broke down during the war; but the Directors made a grant of 1 p.ct. to keep the scheme alive. Now they had come to the conclusion that it was time the co-partnership scheme should be readjusted and revised, so as to bring it in accord with the present day. The Directors were considering how their employees could share to a larger degree in the profits they helped to produce. This could not be done immediately. There were difficulties in the way. But while they were waiting to clear away the difficulties, he was happy to announce that the Directors had passed a resolution that this year, which began on July 1, the bonus should be increased from 1 to 4 p.ct. [Cheers.] He thought this was a good announcement to make; and he knew that it would be welcome to them.

Silver Teapots and Forty and More Years' Service.

The CHAIRMAN said, before sitting down, he had one other duty to perform. There were men who had been at work in the Company for forty years and more. The Directors felt that on such an occasion they ought to remember these faithful men. They had therefore decided to make them a little present, as a souvenir of the occasion. Each present was identical. It was a silver teapot, thoroughly good, so that it could be handed down to their children. There were great cheers as Mr. James Lankester, who had been in the Company's employ 68 years (and still, despite his 81 years, prefers some light service to doing nothing) went up to receive his teapot. Sir Daniel showed the actual indentures of James Lankester with Mr. Ebenezer Goddard. Then there followed Walter Arnold (49 years' service), William Brett (47 years), Nathan Rayner (47 years), Benjamin Smith (42 years), and Mr. Allan Woolnough (40 years). All were received with cheers; but when Mr. Frank Prentice was called up, lightly wearing his forty years' service, there was the applause that a popular chief can always reckon upon. He also had a teapot precisely the same as the men.

And One for Sir Daniel.

Mr. PRENTICE, in his acknowledgment, took the opportunity of thanking Sir Daniel and Lady Goddard for so kindly giving the Company's employees the use of their grounds for this celebration. Proceeding, he said they had just assisted in certain presentations to those who had been in the Company's employ for forty years and over. He thought that if those who had had teapots had to make the choice again that they made forty years ago, they would not go back on the choice they then made; and they would still enlist in the service of the Company. [Applause.] It occurred to some of them that there was one member of the Company who had been even longer in the service than forty years. He referred to their Chairman. Sir Daniel came to the Company in 1872, which made his connection with it practically 50 years. The staff considered it would be a desirable thing to mark his long connection with the Company in the same way as those employees who had been in the service forty years and upwards. The silver teapot which they had decided to present to Sir Daniel was identical in every way with those just presented to the employees. He (Mr. Prentice) thought Sir Daniel deserved a teapot [Laughter]; and, in asking him to accept it, they one and all would join with it the hope that he might be long spared to enjoy health and strength to continue to steer the Company to even greater prosperity than it had enjoyed in the past. [Cheers.]

The CHAIRMAN said he was very much obliged to the staff for the charming little souvenir. He could promise one thing, that he would never "put it up the spout." [Laughter.]

Again the big company spread themselves about the beautiful grounds. There was more music, more games. The evening wore on; and 8.30 came, when Lady Goddard gracefully presented the prizes to the winners in the various sports. So ended a glorious and memorable day for the employees of the Ipswich Gas Company—a day which so happily links together for the Company the past with the future.

GLEANINGS FROM THE COMPANY'S EARLY HISTORY.

There is history in the Ipswich Gas Company which has not only domestic interest, but interest for the whole gas industry. Knowledge as to this has been pretty general; but we get it in greater detail in an interesting brochure which has been prepared, and which gives some of the long history in the space of 46 printed pages. We have read the whole of the compilation; but here we cannot do more than scan the interest it contains. It is seen that it was in 1817 when three prominent Ipswich men, Messrs. Robert Ransome and James Ransome—names well known in agricultural engineering industry—and John Talwin Shewell, a draper and great-uncle of Mr. Frederic Corder (one of the present Directors), projected the idea of supplying the town with coal gas for domestic, business, and public purposes. They were pioneers in our great industry; for it was only a few years prior to this, that public lighting by coal gas had been instituted in London by the Chartered Company. The capital which these three gentlemen subscribed was £2600, which looks very modest when compared with the capital that is now employed, and which is mentioned in the tabulated statement that ends our review of the brochure. By a strange coincidence, the gas plant they erected occupied as nearly as possible the site on which the Gas Company's town offices and workshops now stand. The originators of the scheme were fortunate in having as their first Engineer Mr. William Cubitt (afterwards Sir William) who was a man of great inventive ability, and was Chief Engineer to Messrs. Ransome, and later on a partner in the firm. Omission cannot be made of the fact that he at one time occupied the exalted position of President of the Institution of Civil Engineers, and—as things should be—he received a knighthood for his conspicuous services to the profession of engineering.

The Birth of the Company.

Like all contemporary gas promoters, the founders met with some opposition and much difficulty and disappointment in the earlier years of their new venture. There was opposition to the laying of pipes; but soon a number of houses were fitted with gas-burners, although the price of gas at the time was no less than 15s. per 1000 c.ft. They were then (as always) keen folk in Ipswich; and the century-ago predecessors of present Ipswichians soon saw that the new gas-light was something very much superior to that provided by oil. This was an opportunity to proceed with the formation of a Company to take over the business that had been founded by the "Triple Alliance" of individuals of whom mention has already been made.

The first Act for lighting with gas the Town and Borough of Ipswich received the Royal Assent on May 28, 1821; the authorized capital being £15,000. The Act was a remarkably comprehensive one. It contained some sixty-five clauses, and included regulations not only in regard to gas-works, but in company management. There were one or two curious provisions, one of which (since repealed) will interest lady shareholders. It provided that "any female proprietor being of the age of 21 years and entitled to vote at the meetings shall have power to give her vote by proxy, but that a male proprietor, unless he is resident beyond the distance of ten miles from Ipswich, shall vote only in person."

The judgment and foresight with which the Company has always been administered on both the technical and commercial sides find early evidence in the fact that, soon after the Act was obtained, the originators of the Company bought a piece of ground from the Commissioners of the Port on the side of the River Orwell, and thence the works were removed in 1882. The acquisition of this site for the new works by the waterside was obviously made with the object of receiving coal by ship; and for many years supplies were conveyed in sailing vessels, of about 250 tons burthen, which made regular voyages to and from the North. The gas managers of those days were not troubled by a Miners' Federation nor by a national coal strike; but the manager of the Company must formerly have been frequently filled with anxiety and inexpressible feelings by the complete exhaustion of his coal stock owing to the non-arrival of the ships, due to contrary winds, while sometimes as many as four vessels would arrive by the same tide. The method of discharging cargoes was rather primitive; no machinery being employed. A gang would fill and carry skips or baskets of coal on their backs up a ladder from the vessel's hold into the coal-store. At the present price of labour, such a system would not pay!

The brochure gives us the names of some of the early shareholders, who numbered 201; and there are among them highly distinguished names. Towards the end we find mentioned Daniel Poole Goddard, who with his son Ebenezer Goddard, and grandson—the present the Rt. Hon. Sir Daniel F. Goddard—were to become successively so intimately identified with the successful control of the undertaking. It was in 1826 that Mr. Cubitt retired from the combined office of Engineer and Clerk, and Mr. Daniel Poole Goddard was appointed to the position which he held until 1842. From that year (1826), the name of Goddard has remained prominently associated with the management and direction of the progressive concern.

Sale of Gas by Hours.

We may here extract three or four paragraphs from the source of our information:

It should be remembered that unlike the industry to-day there were no recognized lines laid down for the guidance of those responsible for

gas manufacture; the engineer of those pioneer days often having to design and make the apparatus which was required for the different purposes.

The disposal of the residual products from the coal in the early days was a matter of some difficulty; for instance, there being little or no market for tar, that commodity was often buried in pits which had to be dug for the purpose.

In those days, before the advent of gas-meters, it was customary for a contract to be made between the Company and the consumer for gas to be used, through certain types of burners, for a given number of hours per night per half year, for which there was a fixed charge according to a scale; the consumer undertaking to extinguish his lights at a certain time. Any excess hours used would have to be reported, and made the subject of a surcharge.

This method would suggest that there must have been considerable confidence existing between the Company and their consumers, which was an admirable spirit to encourage; but alas! the following extract from the annual report of 1824 destroys the pretty picture, and one is left to reflect on the frailty of human nature: "Your Committee regret they are again compelled to observe that many individuals still continue to waste the gas by burning a much larger light and for a longer period than they contract for, by which the establishment must sustain considerable loss. They therefore recommend that the superintendent be directed to give notice to such parties as continue so unjust a proceeding that the Company will not longer supply them with gas."

It was not long after this that the gas-meter made its first appearance. It was of the "wet" type; but to-day the "dry" type is favoured.

Ebenezer Goddard—A Pioneer in Gas Heating.

To Mr. Daniel Poole Goddard a large share of credit is given for having laid the foundations of the prosperity of the Company. He was succeeded in the office by his son Mr. Ebenezer Goddard; and he for forty years filled the dual position of Engineer and Secretary. During this long period, the history of the Company is one of continued progress and development. The make of gas in the year 1842 was 9 million cubic feet. To-day it is more than 700 millions in excess of that quantity. The price then was 10s. per 1000 c.ft.; but three years later it was reduced to 8s. In 1847, another application was made to Parliament; and the Company obtained its second Act, which authorized an increase in capital to £37,333. By this Act, too, the control of the Company passed from the hands of a Committee of Management to a Board of Directors. By this time, the Company had been able to reduce the price of gas to 7s.; and it was further lowered to 6s. in 1848.

Mr. Ebenezer Goddard may be said to have had a *penchant* for gas as a fuel for domestic purposes; and long before gas-fires were produced by special manufacturers, he had devised and patented what was probably the first gas-heating stove ever made. Gas-cookers, too, were made at the Ipswich Gas-Works from his designs, and not only were they used in Ipswich, but in many other places. Although great modifications have since been made in the form of such appliances, the principles of the earlier type have been proved to have been sound.

A Hiring-Out Scheme in 1849.

All of us who have dipped into the history of gas heating will know of the robust part that Mr. Goddard—though faced by conditions that in those days must have appeared almost impregnable—took in fostering its establishment. In the matter of hiring-out heating appliances, he stood decades before most other gas managers and administrators. The brochure again informs us:

In 1849, Mr. Goddard published for the Company an address on the advantages to be derived from the general use of gas in private houses, &c., and announced a scheme for supplying on hire gas fittings and apparatus for cooking, heating, and ventilation; the Company engaging to keep the same in repair.

The pamphlet—a model of literary finish—after referring to gas as having been until lately regarded merely as a luxury, whereas now it had been introduced into the dwellings of the humbler classes as well as to the mansions of the wealthy, went on to say that it was becoming a necessity of life, adding that in proportion to its properties being understood, and its benefits experienced, would its use be promoted.

That time has fully justified this prophetic statement is generally admitted. There is now scarcely a household in any town which does not enjoy the advantages of a gas supply.

Big Strides in Expansion.

So rapidly did the use of gas extend in favour and demand that in 1864 additional powers had to be sought, enabling the Company to increase the capital by £50,000 in shares and £12,666 of loans; making a total of £100,000. There followed several important extensions and improvements in the gas making and storage plant; and this went on to the early eighties, by which time the output of gas had increased to 146,832,000 c.ft.—equal to an increase of 1600 p.ct., or more than sixteen-fold during Mr. Goddard's *régime*. The price of gas had been reduced during the same period from 10s. to 3s. 6d. This truly is a remarkable record.

The Goddard Succession Continued with Further Advantage.

Widely known by his contemporaries in the gas profession, Mr. Ebenezer Goddard was President of the British Association of Gas Managers in 1869. At his death in 1882, a new chapter opened in the history of the Company. His son Daniel Ford Goddard—now the Rt. Hon. Sir Daniel Ford Goddard—who had for a decade been his assistant, was appointed to succeed him. The name of Goddard and rapid expansion are inseparable; and, under the management of the new Engineer, the business continued to expand at a rapid rate. In 1883, a fresh Act was obtained which gave the right to issue capital up to the total sum of £175,000, including £37,000 loan. The sliding-scale was one of the principal features of the Act. About this time, too, the Company were utilizing steamships for conveying their coal which they now usually receive in cargoes of 1200 tons. The coal-handling plant for removing the cargoes and transferring them to the coal-stores is to-day of modern order. The new Engineer—"new" in the early eighties—decided to develop the pioneer work his father had done in popularizing the use of gas for heating. Through his instrumentality, the Ipswich undertaking took a strong lead in developing the system of letting gas appliances out on hire. Lectures and demonstrations were given; and, as early as 1886, there was an exhibition of gas appliances of the latest types in the Public Hall. Our designers of modern exhibitions will be interested to know that in this particular, as well as in others, "there is nothing new under the sun." A specially interesting feature of the 1886 exhibition at Ipswich was the model house, with each room so arranged as to illustrate the use of gas to the best advantage. The price of gas then was 3s. 2d. per 1000 c.ft. About this time, too, the town office and show-rooms were established; and these proved to be a great boon to the consumers.

Translation of Mr. Daniel Ford Goddard.

Like his father, Mr. D. Ford Goddard was trained as an engineer. He served his articles with Messrs. E. R. & F. Turner, of Ipswich, and afterwards pursued the study of chemistry as applied to coal and gas, in London, under Prof. Heisch, and at Marecco's Analytical Laboratory, Newcastle-on-Tyne, in which latter city he also spent a profitable year in the office of Messrs. Monkhouse, Goddard, and Co., Public Accountants. Endowed with great commercial ability, he was eminently fitted to the gas-engineering profession; but after five years' full control, during which the Company's business developed and prospered, Mr. Goddard (who ever since he came of age had taken great interest in public matters) resigned his position with the Company on March 31, 1887, with the intention of devoting himself to public work. He gave a farewell supper at the Reform Club Assembly Room, and took leave of the staff and workmen amid sincere regrets at loosing so good a chief.

In addition to the Directors and others, there was present on that occasion the Engineer-elect, Mr. John Thomas Jolliffe, of Sunderland, who had been chosen to succeed Mr. Goddard as at April 1, 1887. But Mr. Goddard had no intention of entirely severing his connection with the Company. A vacancy having occurred on the Board through the death of Mr. Nathaniel F. Cobbold, he was elected in his place; and the directorate thereby secured the invaluable advantage of his judgment and experience. In 1895, when Mr. George Arthur Biddell, C.E., assumed the Chairmanship on the decease of Mr. Sterling Westhorp, Mr. Goddard was elevated to the Vice-Chairmanship; and in 1901 he succeeded Mr. Biddell as Chairman of the Company, which position he still holds.

Thus it will be seen that the association of the Goddard family with the official management and direction of the Company extends to three generations, and covers the long period of ninety-five years. If the time is included during which Sir Daniel's grandfather was identified as a subscribing shareholder and member of the Committee of Management of the Company previous to his appointment as Engineer, it would exceed one hundred years—a remarkable and honourable record indeed, which is probably unique in the gas profession.

The honour of knighthood was conferred upon our friend in 1907 for services rendered to Parliament as Chairman of the Public Accounts Committee, and in recognition of social and religious work founded and carried on by him at the Ipswich Social Settlement. In 1916, he was made a member of His Majesty's Most Honourable Privy Council.

The Régime of the Late Mr. Jolliffe.

We now come down to later years, and to matters that are well within the recollection of, at any rate, many present-day members of the gas profession. Mr. Jolliffe (who had seen service with the old Phœnix Gas Company, and with the Sunderland Gas Company) entered upon his duties in 1887 with the determination to continue the policy pursued by his predecessors. How well he succeeded can be shown by the single fact that by 1911 the price of gas had been brought down to the low figure of 2s. 4d. per 1000 c.ft. Remodelling and extensions occupied a large part of Mr. Jolliffe's time; and to-day the works are modern in every direction. Among its holders is one of a million cubic feet capacity, which was erected in 1897, from the designs of Mr. Jolliffe, by Messrs. S. Cutler and Sons. The Company have also a setting of vertical retorts on the Woodall-Duckham system; and the manufacturing resources include a carburetted water-gas plant, which was erected in 1905. New offices and showrooms were erected in 1892.

All these improvements and extensions required the expenditure of considerable sums of money; and in 1903 another application was made to Parliament for further capital powers. The Act then secured authorized an increase of £160,000, which brought the capital powers up to a total of £335,000. The limits of supply were also then extended; and many villages previously without a supply of gas now enjoy its advantages. In 1903 the Corporation

inaugurated the supply of electricity; but since that year the increase in gas sales has been no less than 75 p.ct.

The Present Chief Officials and War-Time Anxieties.

It was in March, 1914, that Mr. Jolliffe retired, and was elected to a seat at the Board of Directors; and for the remaining six years of his life his ripe experience was of much value to the Company. It will be noticed that his retirement preceded the war by only four or five months; and thus those who succeeded him have had the responsibilities and anxieties that have been the lot of the executive officials associated with gas undertakings during the long and disastrous conflict. The office of Engineer and Secretary were then divided; Mr. Frank Prentice and Mr. G. A. Mallett, both of whom had for many years been in the Company's service, being appointed to the respective positions. One of their first achievements was to start a co-partnership fund, with the object of giving the employees a more direct and beneficial interest in their work. For the first two years, a bonus of 5 p.ct. on wages was paid; but as it was based on a sliding-scale of prices for gas, the war conditions unfortunately extinguished the bonus. However, in order to maintain interest in the fund, the Directors kindly made an *ex gratia* payment equal to 1 p.ct. until this year; and now that the Company have received an Order under the Gas Regulation Act, modifying the sliding-scale, some revision will undoubtedly be made in the co-partnership scheme, to the advantage of the members.

The Correct Policy.

We need not describe from the brochure the difficulties which the Company encountered during the weary years of war, the incidence of which difficulties in their case was much that of all other gas undertakings throughout the country. We cannot, however, do better than end this review by adopting the final words of the book:

> Looking backward over a century of public service, it must be conceded that this long record of the Ipswich Gas Light Company is one of which any concern might be justly proud. From a very small beginning, it has grown and developed until it has become an important and indispensable organization of modern life, serving rich and poor alike.
>
> Among the vicissitudes experienced in the course of its long career, the Company has weathered the storms of adversity produced by no less than four wars and numerous coal strikes; and the fact that it is still able to supply the community with light and fuel at a comparatively low price augurs well on commencing its second century.
>
> What will happen in the future no one can, of course, foretell, though indications are not lacking which point to better times ahead. But come what may, the Gas Company will still pursue its policy of devoting its efforts to: (1) Maintaining an efficient supply of gas at a cheap price; (2) giving a reasonable return to the shareholders; and (3) treating its employees justly in a spirit of co-partnership, and from them will be expected continued loyal and willing service.

The Present Position.

The present position of the undertaking is well summarized by the following tabulated statement:

Year ended December 31, 1920.

Share capital raised	£118,730 0 0	
Amount of premium capital	£39,210 18 3	£193,865 18 3
Loan capital raised	£35,925 0 0	
Number of shareholders		764
Coal carbonized		37,838 tons
Oil used for carburetted water gas		67,300 gallons
Gas made		709,017,000 c.ft.
Amount of revenue		£188,959 15 6
Number of consumers	Ordinary, 5432; Automatic, 13,175	
Number of pennies collected from automatic meters during 1920		17,108,400 = 159 tons
Number of stoves on hire, ordinary and automatic		14,465
Number of workmen employed		275
Amount paid in salaries and wages		£55,998
Number of co-partners		165
Number of miles of main		88
Area of district supplied		17½ sq. miles

SOCIÉTÉ TECHNIQUE DU GAZ EN FRANCE.

The Recent Congress in Tours.

Among the general items of business transacted at last month's congress of the Society at Tours, it may be noted that the election took place as honorary members of Mr. Thomas Hardie, the Chief Engineer of the Gas Light and Coke Company, and President of the Institution of Gas Engineers for next year, and of Mr. Charles A. Monroe, the Vice-President of the People's Gas Light and Coke Company of Chicago, and President of the American Gas Association for 1920-21.

The membership of the Society is 23 less than it was a year ago; the election of 37 new members being more than counterbalanced by the removal of 60 members through death, resignation, &c. The present membership numbers 799. Contributions from companies represented in the membership are, however, greater by nearly 3000 frs., and stand at 43,535 frs.

The report of the Committee which each year briefly reviews the proceedings of the Society in the intervals between the annual congresses, begins by recounting the losses which death has caused in the membership. The three honorary members whose names occur in this connection are all those of Englishmen—namely, Lord Moulton, Mr. Andrew Dougall, and Mr. Robert O. Paterson. Of its native members, the Society deplores the decease of MM. P. Audoun, A. Carnot, H. Charvet, L. Chavannes, P. Craponne, A. Defoy, F. Depeaux, J. Leclaire, H. Leroy, and Ch. Vauthier.

During the past twelve months, Sub-Committees of the Society have considered, among other questions, the sale of gas on a thermal basis, the complete carbonization of coal, the standardization of retort lids, the calorific power of gas, benzole extraction (in reference to proposed legislation), and the industrial applications of gas. A study has also been made of water-gas plant suitable for works of small size; government permission to employ 15 p.ct. of this gas in that supplied for lighting, &c., having conferred considerable importance upon such installations.

The report concludes by referring to the serious economic conditions which the industry continues to endure, and quotes the utterance of the previous President, M. Laurain, in 1920, to the effect that now more than ever before attention needs to be concentrated on the improvement of processes of carbonization, and on the employment of mechanical appliances to the utmost degree. Maximum yield and minimum manual labour must be the two-fold aim of the gas engineer in conjunction with energetic propagation of the use of gas for industrial heating.

The Sub-Committee appointed to report on new applications of gas have to confess that they have had very little to do. The restrictions imposed on gas consumption by public authorities have discouraged enterprise on the part of constructors of appliances; and had it not been for one or two new pieces of apparatus shown at the Industrial Exhibition at Paris in November last, material for a report would have been altogether lacking. Of these appliances, one of the most notable is the so-called "T.I.P." stove, the principle of which is as follows: Instead of allowing the products of combustion from a single gas-burner to escape freely, the inventor causes them to traverse passages in a species of chest of refractory material, and to emerge on to the vessels to be heated. Three outlets being provided for the spent gases from a single burner, four heating spaces are available. It is understood that the vessel placed above the burner is of such size that the products of combustion cannot directly escape. The value of the appliance is thus seen to consist in its capacity to keep four vessels at a more or less boiling heat. Another feature of the stove is the facility for the supply of a small quantity of hot water. This is achieved by means of a copper coil mounted in its body, and connected to a metal receptacle, the water in which becomes heated by thermo-syphonic action. A projecting copper tap allows of supplies being drawn off. The thermal efficiency of the stove, as tested by heating measured quantities of water, has been found to be 40 to 50 p.ct.

Another newly introduced appliance is a radiator consisting of incandescent burners with metal mantles. The burner (of the ordinary type) is provided with a member of refractory earth by which the flame is directed round the lower part of the mantle; combustion taking place on the outside surface of the latter. These mantles, in groups of two or four, appear to have numerous uses in radiators for warming rooms, water heaters, &c.

Gas-cooking stoves were in evidence at the Paris Industrial Exhibition, and included some models for use with any burner, and others with double or triple lagged walls of great efficiency for various descriptions of cooking.

A Sub-Committee of the Society concerns itself with the technical advancement of the members of the industry. Its report, presented to the Congress, announces the publication almost immediately of a monograph specially written in reference to the avoidance of waste of gas in the course of manufacture, and afterwards by leakage. The types and the laying of mains, the construction and defects of meters, and the use of compressed gas are among the subjects particularly treated in this brochure by a technical writer (not named in the report), to whom a prize of 1000 frs. has been awarded.

The only other matter discussed in this report is the holding of a technical congress, extending over a week, for the special benefit of the junior members of the staffs of gas undertakings. This has been arranged (and will be held very shortly) as a result of the conclusion that the specialist tendency of the conditions of employment stands in need of some corrective, and that it will be greatly to the advantage of the younger members of the industry to meet their confrères engaged in other branches, and to have the opportunity of discussing not only technical matters but also commercial and administrative subjects under auspices which are to be rendered favourable by the participation of leaders in these various spheres. By the courtesy of the Paris Gas Company, premises for the headquarters of this "Gas Week" have already been provided.

At each congress, it is the custom to present a report on the papers judged to be the best of those read at the meeting the previous year. Such honourable mention is this year accorded to M. Forrières for his paper on the storage of coal underground, to M. Payet, for that on a new type of low-pressure gas-burner, and to M. Brodin for his two communications.

Commercial Gas Company's Dividend.—The Directors of the Commercial Gas Company have declared a dividend on the ordinary stocks for the past half year at the rates of £4 5s. 4d. p.ct. per annum on the 4 p.ct. stock and £3 16s. 8d. p.ct. per annum on the 3½ p.ct. stock, payable on Aug. 15.

AN AUTOMATIC SAFETY GAS CUT-OFF.

By M. GREBEL.

[A Paper read before the Société Technique du Gaz en France.]

This apparatus is a safety device for attachment particularly to the meter of a domestic establishment for the purpose of automatically cutting-off the supply of gas in circumstances where the pressure at the place of consumption falls through a tap being left open, by the breakage of a pipe or rubber connection, or from other similar causes leading to a considerable escape of gas. The apparatus is the design of M. Conti in collaboration with an engineer attached to one of the large French gas companies.

M. Grebel prefaces his description of it by brief references to earlier devices for the same purpose—namely, those of M. Serment noticed at the 1889 Congress, of M. Picot which formed the subject of communications at the Congresses of 1911 and 1912, and of M. Sost which formed the subject of a paper in the former year. The Conti cut-off, although appearing to be of somewhat complex construction and action—as shown in the engraving—is, however, simple in operation and without liability to mechanical derangement. It works on the hydrostatic principle of the filling and emptying of a syphon similar to those employed in CO_2 recorders. The trapping liquid consists of water containing 20 p.ct. of glycerine.

As shown in fig. 1 the apparatus consists of a U tube S, through which the gas passes on its outlet from the meter. This tube has an enlargement S_1, which latter communicates by a small tube T_1 with two branch tubes T_2 and T_3. The former tube is expanded at its upper end into a bulb R, which communicates with a small syphon s the lower extremity of which s_1 (drawn out into a fine point) dips into a small cup G. There are a number of small holes in the upper part of this cup, which is therefore at atmospheric pressure. The cup is attached to the syphon s so that its height can be adjusted according to the degree of sensitiveness required. A larger surrounding vessel V receives the overflow of liquid escaping from the holes in the cup. It is connected by a rubber tube C with a movable container M, which in the ordinary way rests upside down on the funnel E that is the upper end of the tube T_3. This funnel is at a higher level than the bend of the syphon s, and thus allows of the latter being filled.

The apparatus is prepared for use by pouring liquid into the funnel to fill the syphon. Liquid passing from the syphon first fills the small cup G—the excess overflowing through the holes in the cup into the vessel V. The levels of the liquid are then as shown in fig. 1. The contents of the tube T_3 and of the cup G (connected by the syphon s) are at atmospheric pressure; and the level N is thus the same in each. On the other hand, the pressure of the gas in the tube T_1 creates the level N^1. The difference between these levels therefore represents the effective pressure (P) of the gas. In fig. 1 the gas is shown passing freely through the U tube.

Suppose now that, from some cause, the pressure of the gas beyond the apparatus begins to fall. The difference of levels P becomes less. The liquid in T_1 rises, being supplied simultaneously from the branch T_3, and the cup G, as shown in fig. 2. The common level n of the branch T_3 and of the cup G falls, while the level n^1 in S_1 rises until the lower pointed end s_1 of the syphon is uncovered. At this point the syphon s suddenly empties, and the liquid contained in the bulb R proceeds to occupy the positions in the different tubes shown in fig. 3—that is to say the passage of gas through the U tube is automatically cut off. This cut-off warns the consumer either of the presence of a leak or of omission to close a tap after the meter tap had been turned off. In the case when there is a slow leakage from the pipes, the level of liquid is lower in the left-hand branch, giving rise to a momentary compression of the gas which remains in the right-hand branch of the U tube.

To effect the re-functioning of the apparatus, the passage of gas is accomplished by lowering the vessel M below the level of the vessel V (fig. 3), which then fills automatically. The contents of M are then emptied into the funnel E, as shown in fig. 4. The syphon s fills, also the cup G; and the various levels resume the relative positions shown in fig. 1.

The sectional area of the base portion S_1 of the U tube can be calculated so as to bring about the emptying of the syphon at a pressure relatively independent of the pressure of the gas. For this, the sectional area of S_1 needs to be much greater than the cross section of the tube T_1. If this is the case, it is of little importance whether the level of liquid, when the apparatus is in normal working, is above or below N^1 (fig. 1). The pressure required for the emptying of the syphon is adjusted by raising or lowering the cup G, so as to vary the distance between the point s_1 of the syphon and the surface of the liquid determined by the overflow apertures in the cup.

The apparatus exhibited to the Congress was constructed of glass; but M. Grebel referred to the practicability of making it in metal; and though he said nothing of its practical applications, he felt convinced that the device could not fail to interest gas men from its ingenious technical design.

AUTOMATIC REGULATION OF PRESSURE OF TOWN GAS.

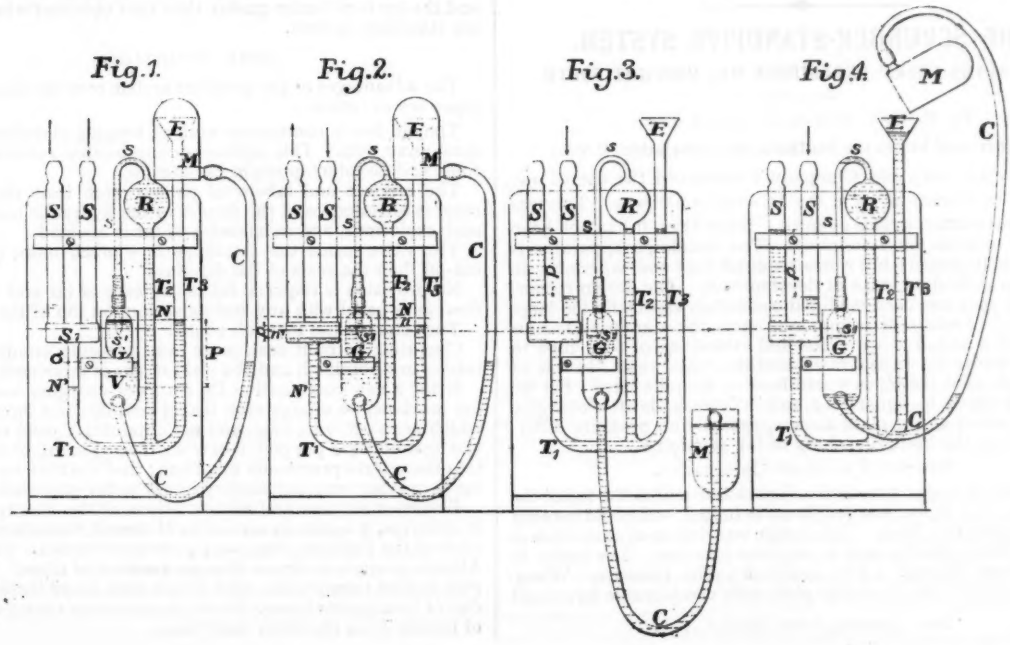
By M. FRÈRE.

[A Communication to the Tours Congress of the Société Technique du Gaz en France.]

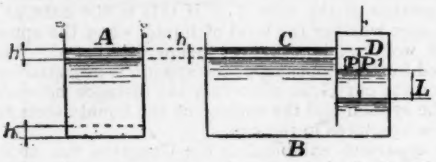
In a paper read before the Congress of 1905, M. Frère described the arrangement devised by him for securing constant pressure over the system of town gas-mains, whatever the hour-to-hour variation in consumption. As he then explained, the regular action of the device required a constant pressure at the inlet of the regulator; and if this was not the case, the use of a special regulator for the purpose was necessary. Since the previous communication he had, however, modified the device; so that it was possible to dispense with the extra regulator. The appliance having been in regular satisfactory use at Chantilly, he described it at the wish of members of the Society who had seen it in operation there.

In the original device, when the gas consumption is at its lowest point, the bell of the regulator occupies a position (say) a. At the point of maximum consumption the bell descends to a point (say) b, after having received an overload of a weight p. Thus a and b are the extreme limits of the travel of the bell—starting from the minimum pressure at the inlet to the regulator. In M. Frère's device, the weight p is supplied in the shape of a given volume of water, which passes into a tank placed on the regulating bell from another tank, of calculated size, placed at a given height alongside.

When the regulator bell falls, owing to an increase in consumption, water passes from the fixed tank into that on the bell, and provides the overload necessary for the increase of pressure. When the consumption falls, the operation takes place in the



opposite direction. The correct functioning of the regulator, in correspondence with the consumption of gas on the system, thus takes place satisfactorily. But if the pressure at the inlet of the regulator alters—as, for example, by the putting into use of a telescopic gasholder—the gas pressure at the inlet of the regulator may be almost doubled, and the gas passed by the regulator therefore greatly increased. As it is the pressure on the outlet side of the regulator which controls the height of the bell, the latter rises in order to bring the volume of gas delivered to what it was before the operation of the gasholder. Hence, part of the water contained in the small tank on the regulator bell passes back into the fixed tank, and thus reduces the weight on the bell and (proportionately) the pressure of gas on the town system. For the purpose of avoiding this irregularity, the original device has been modified, as shown.



The fixed tank, B, has in it a partition, starting about 2 cm. from the bottom of the tank, and dividing the latter into two unequal parts. The smaller tank, D, is covered, and receives a pipe conveying gas at the pressure of the inlet of the regulator. Let it be supposed that the system is in equilibrium for a given delivery of gas corresponding to a given pressure on the town system, and assume that the telescopic gasholder comes into action. The excess of pressure of gas from the gasholder over the atmospheric pressure varies from the value P to the greater value P^1.

Two things then take place: (1) The regulator bell rises through a distance, h, so as to keep constant the pressure at the outlet of the regulator, reducing the area of the passage around the cone traversed by the gas. The water in the tank A tends to flow into the tank B. (2) But at the same time, in consequence of the increase of pressure in the compartment D, the level of the water in the compartment falls, while that in the compartment C rises to a corresponding extent. In order to avoid all flow of water from A to B, it is necessary that the height of the level of water in C should be equal to h. It is easy to adjust the sectional dimensions of C and D in order that this should be the case.

The method of doing so is as follows: Let L be the distance which the water falls in D. The height which the water rises in C then requires to be equal to h. By calling the sectional dimensions of D and C, respectively, d and c, we have

$$d \times L = c \times h.$$

$$h + L = P^1 - P.$$

Whence $$d\,(P^1 - P - h) = c \times h.$$

As $B = c + d$ (B being the sectional area of the tank B), we have two equations for the determination of c and d.

The principle of the action of the apparatus cannot be said to be of mathematical accuracy. To give it greater precision, it would be necessary to take account of other factors—particularly the variation of the area around the cone according to the different heights of the bell. A few millimetres of water more or less in the movable tank do not give rise to any appreciable irregularity in working; and the results have been exceedingly satisfactory in practice.

THE SCRUBBER-STANDPIPE SYSTEM.

WHAT SEVEN YEARS' EXPERIENCE HAS BROUGHT FORTH.

By R. C. CONGDON, of Atlanta (Ga.).

[A Paper read before the Southern Gas Association, U.S.A.]

On Dec. 21, 1913, our Company commenced the use of my scrubber-standpipe system at the Atlanta Gas-Works. This was the first installation in this country. Since then, it has not been necessary to clean our standpipes. The standpipe apparatus is very simple in design; but it has required time and experience to bring it up to its final stage of development. The design recommended in 1914 has been modified somewhat, especially for large gas-works.* Instead of using sheet steel, the standpipe is now made up of a cast-iron valve-box and extensions of 8-in. pipe to reach the hydraulic or foul main, and the lower seal. It was at first thought that the pipes would have to be quite large; but we find that a pipe 8 in. square is ample. Tests made after charging the lower retort at our plant show apparently no pressure difference between the bottom and top of the standpipe.

FUNNEL PROVIDED ORIGINALLY.

The original design provided a funnel and seal at the top of the standpipe; and liquor was fed into the funnel, and could be seen from the operating floor. This liquor was delivered at the rate of 6 to 8 gallons a minute, and at very low pressure. The liquor is now delivered through a ⅛-in. nozzle at 13 lbs. pressure. When thus delivered, it hits the baffle-plate with considerable force, and splashes to the sides of the pipe in a much more effective manner than is accomplished by a larger stream moving at slower speed. We used to have some trouble on account of liquor hitting the valves in the standpipe, and splashing into the retort standpipe connections. The large stream under small head did not splash properly when coming into contact with the baffle-plate, but fell straight through the centre of the pipe, instead of flowing down its sides. With a smaller stream at higher pressure, we obviate the trouble of liquor splashing into the standpipe connections.

The original design provided an eccentric latch for holding the valve closed. Experience has shown that the design was too delicate in the hands of retort-house stokers, who hit the latch with their heavy tools; and because of the leverage, heavy strains were brought against the outside lever and inside valve arm which soon made the eccentric latch ineffective. We now use a different type valve latch, and a weighted lever arm.

The design of the retort standpipe connection has been changed. This connection is now made of cast iron, instead of a combination of steel collar and steel pipe. It is shorter and easier to construct.

CHANGES IN THE LOWER SEAL ARRANGEMENT.

The lower seal arrangements have also been changed. Instead of using a continuous trough, we now have individual seal-boxes, and the liquor flows from these boxes to a pipe leading to the tar well or separating tank. By observing the various streams, it is possible to know whether or not the sprays in the tops of the standpipes are receiving sufficient liquor. Occasionally the stream from a seal-box will show that it is growing smaller. When this condition is observed, the operator unscrews a plug on the top of the spray, and inserts a small rod to clean-out any material which may have lodged in the ⅛-in. opening. We have very little trouble with the sprays, as all the liquor flowing to them passes through a series of fly screens. The individual seal-boxes shown in my original design have proved very satisfactory; but unless one prefers to operate without a seal, I would recommend the usual hydraulic main, especially for small works.

We have recently refilled the arches in our plant, installed the new design standpipe system, and done away completely with the washboxes, which latter had taken the place of our original hydraulic main. The standpipes are connected direct to the foul main, and in consequence all the tar in the retort-house flows down the various standpipes through the lower seals, and finally to the separating tank at the end of the retort-house. The valves in the standpipes make this arrangement practicable. It is not possible to maintain the same pressure or vacuum at the outlet of each retort. The amount of variation will depend upon the operation of the retort-house governor or the governor at the exhauster, and on the design of the pipes and mains used to convey the gas from the retort-house, &c. There is probably in most retort-houses a variation of one or more tenths; and where a number of retorts are connected to a single standpipe, it is necessary to have valves to prevent drawing-in air or the escape of gas. I have known explosions to occur in the usual hydraulic main which blew the tar to the roof of the retort-house. I prefer to operate under a slight back-pressure. The valve inside the standpipes prevents the loss of a great deal of gas. It is also useful in preventing coke and coal from dropping into the lower seal, and is of value when scurfing retorts.

At present, we are putting through each standpipe 1·4 gallons of liquor per minute. The temperature of the liquor at the top of the pipe is 152° Fahr. and the lower seal 177° Fahr. We use centrifugal pumps to circulate the liquor.

Careful analysis has shown that there is no loss of ammonia, and the tar is of better quality than that obtained when using the old standpipe system.

SOME ADVANTAGES.

The advantages of the scrubber system over the old-style standpipes are as follows:

The old heavy continuous work of keeping standpipes open is done away with. This means a considerable reduction in pay-rolls, and no interruption in gas making.

The expense and labour of pulling pitch from the hydraulic main is obviated; and the danger of the hydraulic main losing its seal, explosions, and overflowing of tar is avoided.

The valve inside the standpipe is a much more positive gas cut-off than the seals of the dip-pipes.

No provision is required for taking care of tar and liquor overflow, as is usual with any sealing system on top of the bench.

The retort-house is much cooler.

Operating without seal, more even pressure conditions in the retorts are obtained, and the yield of gas is increased.

Using a new combination De Brouwer charging and discharging machine, we charge 1700 lbs. of coal into our through retorts, which are 21 ft. 7 in. long, and are obtaining a yield of 5·5 c.ft. of 580 heat unit gas per pound of coal. The 1700 lbs. of coal charged into the retorts practically fills them; and the coke we are obtaining is proving very satisfactory in our water-gas plant.

Besides many successful installations of the standpipe system in America, it is also in service at Montreal, Canada, and is being tried at the Beckton plant, and elsewhere abroad. The plant in Atlanta consists of eleven through benches of nines. The standpipe system requires the work of one man about three hours each day of twenty-four hours. The work consists of raking small lumps of carbon from the lower seal-boxes.

* See "JOURNAL," Vol. CXXXV., p. 72.

FIFTH REPORT OF THE RESEARCH SUB-COMMITTEE OF THE GAS INVESTIGATION COMMITTEE OF THE INSTITUTION OF GAS ENGINEERS.

THE SIMMANCE RECORDING CALORIMETER.

(*Concluded from* "JOURNAL," *July 6, p. 40. References hereunder are to pages in our two preceding numbers, Vol. CLIV.*)

PART II.

THE BEASLEY RECORDER.

There is now a totally different type of recording calorimeter to consider, of which the "Calorgraph" of Messrs. Alex. Wright & Co., the "Sigma" calorimeter of Dr. Stewart, and the "Beasley" recorder of Messrs. Parkinson and Cowan may be taken as representatives. The Beasley instrument was subjected to systematic testing concurrently with the Simmance recorder.

This was done because this instrument has firmly established itself and is already in use in many works. It is simpler in construction than the Simmance recorder. It is eminently suitable for detecting variations in gas quality, and may thus serve to keep a record of changes in gas quality in between times of testing on an ordinary water-flow calorimeter, even if its record is not taken as accurately indicating the gas quality. The instrument is so well known that a detailed description is unnecessary; and because there are fewer parts to examine, the tests are much shorter and less detailed.

As a standard instrument, the Beasley recorder possesses two marked defects:

(1) No attempt is made to compensate for changes in atmospheric conditions. The extent of error due to this cause may be readily ascertained for given conditions from the "Tabular Numbers," and will amount to ± 10 p.ct. during the year, and ± 5 p.ct. during comparatively short periods, depending upon atmospheric temperature and pressure. Correction can be applied to the chart if simultaneous records on a barograph and thermograph are available; but the process is tedious. Less detailed, but quite useful correction, can be applied by making use of the readings of maximum and minimum thermometers over suitable periods, especially if the difference between the two is not very great.

(2) There is no means of checking the record except by a test on an independent water-flow calorimeter. Unless this is done on the same gas stream for other purposes, the testing equipment must be complicated by the addition of such a water-flow calorimeter and its necessary appurtenances.

NET v. GROSS C.V. RECORDING.

The Beasley recorder was brought out at a time when the controversy of gross and net C.V. determinations was in progress, and its claims as a net recorder were strongly pressed. Now that the use of the gross C.V. is official, the recorder is regarded somewhat dubiously as being a net recorder. The only reason for terming the recorder a net C.V. recorder is that the products of combustion leave the calorimeter at such a temperature (115° to 120° C.) that the water vapour is not condensed. The net heat is not measured in the same sense that the gross heat is determined by complete absorption, as in a water-flow calorimeter. Of the net heat only a portion is absorbed, and the C.V. is inferred from the rise in temperature. The point at issue is whether the ratio of gross heat to the absorbed heat may be made the basis of calibration, as is now done for the ratio net heat to absorbed heat.

It is pointed out that gases with the same net C.V. may have different gross C.V., and *vice versa*. We now proceed to see whether or not these differences are of any practical consequence.

Gases of the following compositions will be considered.

	Straight Coal Gas.	Blue Water Gas.	Low-Temp. B.W.G. as in Steaming Verticals.	Mond Gas.	Coke Producer Gas.
CO_2	2·2	4·8	14·5	12·9	4·0
O_2	0·0	0·0	0·0	0·0	0·0
C_mH_n	3·2	0·0	0·0	0·0	0·0
CO	6·9	40·1	27·5	13·2	29·0
H_2	47·2	51·9	57·5	24 8	2·5
CH_4	36·9	0·1	0·5	2 3	0·0
N_2	3·6	3·1	0·0	46·8	64·5
	100·0	100·0	100·0	100·0	100·0
Total combustibles	94·2	92·1	85·5	40·3	31·5
Calc. C.V.					
Gross	622·3	294·6	276·5	144·1	100·2
Net	551·8	268·0	246·5	129·2	98·9
Ratio G/N	1·128	1·099	1·122	1·115	1·013

Next we proceed to add in turn the other gases to the original coal gas, so as to give mixtures of the same gross C.V., noting the amount of each gas required and the corresponding net C.V.

It is to be noted that the addition of such inerts as CO_2 and N_2, or of air *per se*, in any amount whatsoever, does not alter the character and relative proportions of the combustibles present; and hence the ratio gross to net C.V. remains constant in such cases.

C.V. of Mixture, 550 B.Th.U. Gross.

Percentage of Added Gas.	Ratio Gross to Net.	Net C.V.	
11 p.ct. inerts	1·128	487·6	max. 490·2
13 ,, producer gas	1·124	489·4	min. 487·6
14·5 ,, Mond gas	1·127	488·0	
20 ,, poor B.W.G.	1 127	488·0	diff. 2·6 B.Th.U. Net
21 ,, good ,,	1·122	490·2	

C.V. of Mixture, 500 B.Th.U. Gross.

20 p.ct. inerts	1·128	443·3	max. 447·7
23 ,, producer gas	1·119	446·8	min. 443·3
25 ,, Mond gas	1·126	444·0	
35 ,, poor B.W.G.	1·126	444·0	diff. 4·4 B.Th.U. Net
37 ,, good ,,	1 117	447·7	

C.V. of Mixture, 450 B.Th.U. Gross.

27·5 p.ct. inerts	1·128	399·0	max. 404·7
32·5 ,, producer gas	1·112	404·7	min. 399·0
36 ,, Mond gas	1·125	400·0	
49 5 ,, poor B.W.G.	1·125	400·0	diff. 5·7 B.Th.U. Net
52 ,, good ,,	1·113	404·3	

C.V. of Mixture, 400 B.Th.U. Gross.

36 p.ct. inerts	1·128	354·6	max. 362·0
42 ,, producer gas	1·105	362·0	min. 354·6
46 ,, Mond gas	1·125	355·6	
64 ,, poor B.W.G.	1·124	355·6	diff. 7·4 B.Th.U. Net
68 ,, good ,,	1·108	361·1	

C.V. of Mixture, 350 B.Th.U. Gross.

43·5 p.ct. inerts	1·128	310·3	max. 319·0
52·6 ,, producer gas	1·097	319·0	min. 310·3
57·0 ,, Mond gas	1·123	311·9	
78 ,, poor B.W.G.	1 123	311·9	diff. 8·7 B.Th.U. Net
83 ,, good ,,	1·104	317·0	

C.V. of Mixture, 300 B.Th.U. Gross.

52 p.ct. inerts	1·128	266·0	max. 276 0
62 ,, producer gas	1·087	276·0	min. 266·0
67 ,, Mond gas	1·122	267·4	
93 ,, poor B.W.G.	1·122	267·4	diff. 10·0 B.Th.U. Net
98 ,, good ,,	1·100	272·7	

The first point noticeable is the increase in the difference between the maximum and minimum net C.V. for the same gross C.V., as the C.V. of the mixture is lowered. This is to be expected, as the lower the C.V. the greater the permissible amount of diluent gases, whose ratios gross to net differ notably among themselves—*e.g.*, the poor and the good blue water gas. Even at 300 B.Th.U. gross, however, the greatest difference in the mixture is only 3·7 p.ct. At 450 B.Th.U. gross, allowing a good variety of useful mixtures, the difference is only 1·4 p.ct., and is less than other errors to which the instrument is liable. Down to this point, therefore, there is no cause to fear that changes in the gross and net C.V. will be so differently affected in changing the character of the mixture that by working on the one basis injustice may be done to a gas which is subsequently tested on the other.

EFFECTS ON GAS RATE OF CHANGES IN SPECIFIC GRAVITY.

In the Beasley recorder the gas rate is controlled by means of a pendulum and escapement, allowing a definite rate of rotation of the diaphragm of the meter, the pressure upon which provides the motive power. A second meter of the ordinary type used for C.V. testing was placed in series with the escapement meter; and gases of widely different densities were passed through the system, using 20-10ths pressure at the inlet meter. Hydrogen, coal gas, blue water gas, Mond gas, and air were found to pass through the escapement meter at identical rates—viz., 2 c.ft. hour. Even when atmospheric temperature and pressure changed, the rate was still 2 c.ft. hour, measured under prevailing conditions—*i.e.*, not reduced to 60° Fahr. and 30 in. barometer.

EFFECT OF CHANGING PRESSURE AT INLET OF METER.

The pressure recommended at the inlet meter should lie between 15-10ths and 30-10ths in. water gauge. If the pressure is higher than this, since the free revolution of the diaphragm is prevented by the escapement, the water line may be depressed on the inlet side of the meter, with a consequent increase in its capacity per revolution.

Trial was made with pressures at the inlet governors increasing

by steps up to 6 in. water gauge. The small dry governors provided seem to act very well, and the meter was only slightly under 1 p.ct. slow at the highest pressure used. With the governors loaded so as to be out of action, there was a considerable alteration in registration with increase of inlet pressure; and with 6 in. pressure at the inlet meter, gas was able to force its way through the meter without registration.

Adjustment of Capacity of Meter.

The meter is adjusted by bringing the water up to a glass pointer in a sight-box. During this process, gas is shut off from the meter, and a small pet cock is provided, the opening of which places the inlet meter at atmospheric pressure.

The makers of the recorder state that during water lining the pendulum of the escapement meter should be allowed to swing freely. For an accurate setting of the meter, some further precautions were found to be necessary. If the pendulum is removed and the drum of the meter is allowed to revolve freely under the influence of the gas pressure, four points will be found at which there is a rather marked oscillation of the water level in the sight-box—due, of course, to unsealing of the gas chambers. By marking the spindle, these points can be located with respect to the dial of the meter. It is not wise to use the pointer for this purpose, as it is only friction-tight on the spindle, and liable to displacement.

The final adjustment of the water line should be made with the drum mid-way between two such oscillation points. Also, it is much more reliable to drop the water line slightly, and adjust by pouring water into the meter-case until the surface of the water rises into contact with the pointer, than to run out water until the pointer and water surface separate. In the latter case, uncertainty of the position of the water line to the extent of 1 to 1·5 mm. may easily occur, owing to surface tension keeping the water in contact with the pointer.

The method of setting finally adopted was as follows: With the water-line slightly too low, the drum is given at least one complete revolution, finishing with the drum in a position mid-way between two oscillation points. Water is then run in very slowly through the pet cock below the thermometer, using a piece of rubber tubing and a funnel until the water surface just touches the pointer, contact with which can be determined very accurately by the apparent distortion of printed matter viewed mirror-wise in the surface of the water. The pet cock at the inlet meter is open during this process and the pendulum swinging freely. With such precautions, the capacity of the meter was found to be reproducible within ± 0·1 p.ct. If, however, they were neglected, it was possible to obtain a setting within ± 0·2 p.ct. as a rule, but with an occasional outstanding discrepancy of 1 p.ct. or more. These larger discrepancies were eventually traced to calibration being conducted in the immediate vicinity of an oscillation point.

Constancy of Capacity of Meter.

One of the most troublesome sources of error with the Beasley recorder is the gradual drop in the water line of the meter. If the gas supply to the calorimeter is at any point in its course subjected to a temperature below the testing-room temperature (which it subsequently attains), it will reach the inlet meter as an unsaturated gas, provided it has not come into contact with water in the meantime.

Re-saturation is effected in the meter; and in round figures 0·2 c.c. of water per cubic foot must be imparted to the gas if it has been subjected to a temperature 10° Fahr. below the test-room temperature (assumed as 60° to 70° Fahr.), a temperature drop which is very common. As 48 c.ft. are passed per 24 hours, the meter would in such circumstances lose 9·6 c.c. of water, which would increase the capacity of the drum by roughly 1 p.ct. per day.

In the case of the recorder tested and four others of the same type under general observation, daily setting of the water line was a *sine qua non;* the general increase in capacity being of the order of 1 p.ct. per day, and slightly greater in winter than in summer. The unsaturated condition of the inlet gas has been verified on several occasions. The use of a saturator alongside the meter (so as to be at the same temperature) reduces the trouble considerably, but not entirely; and this points to a certain amount of gland-leakage at the meter-spindle, possibly accentuated by the vibration of the pendulum and the escapement. Small amounts of leakage are relatively important, on account of the small capacity of the meter. This is a point requiring close attention; and the amount of the error will vary with individual installations, and with circumstances. One to three days is suggested as the maximum period allowable between resettings.

The proposal to use oil in the meter in order to overcome difficulties owing to evaporation with water, seems to be unsound in principle. There will be a liability to stripping when the gas is better than usual, and enrichment when it is poorer, even though a suitably fractionated oil is used in the first place. Change in composition of the gas without real change in C.V. may give rise to an apparent change in C.V. due to absorption or enrichment phenomena.

Differential Oil Columns.

The calorific value of the gas is deduced by imparting a portion of the heat of the burning gas to oil contained in one limb of a large U-tube. Initially the surface of the oil in both limbs is at the same level. Upon heating one limb, the density of the oil therein is reduced, and the free surfaces of the oil are no longer at the same level. The relative positions of the surfaces are marked by floats, the movements of which are communicated to the pen-spindle.

The mean temperature of the hot column of oil will be dependent upon several factors. The flame does not play upon the oil chamber directly, but burns freely in a tube 2¼ in. diameter passing up the centre of the oil column. Radiation from the flame to the oil will play but a minor part in the heat transfer, and the greater portion is transferred through the medium of the column of hot products of combustion and air passing up the tube. The mean temperature of this hot stream will depend upon the amount of heat generated by combustion of the gas and the amount of air passing up the tube. Equilibrium will be reached by balancing the heat reception against the cooling of the hot column by radiation and air contact. As the laws connecting the temperature rise of the oil with the C.V. of the gas are very complex, empirical calibration of the recorder is necessary. The C.V. chart is not one of uniform divisions, as in the case of the Simmance recorder, but the divisions become more crowded as the higher C.V.'s are approached.

Regulation of Draught up Chimney.

The pen is set to zero with both oil columns at the same temperature. The capacity of the meter is adjusted, and the meter pendulum set to allow exactly 2 c.ft. per hour of gas to pass. The gas is then lighted, and at least an hour allowed for the instrument to warm-up. The C.V. indicated on the chart should be that determined by a water-flow calorimeter under like conditions of room temperature and pressure.

The chimney shaft of the recorder is surmounted by a cap with a circular opening 1 in. in diameter, into which a ¼-in. screw projects. By advancing or withdrawing this screw, the volume of air passing up the shaft can be regulated so that the correct C.V. is shown, and as indicated by the position of the pen on the chart.

This screw adjustment is very sensitive; and advancing the screw by one turn, or $\frac{1}{20}$ in., causes a change in the charted C.V. of approximately 10 B.Th.U. After the instrument has been in use for a few weeks, the inside of the chimney shaft, the cap, and the adjusting screws become covered with a deposit, which has the same effect as screwing in the regulator—*i.e.*, the draught through the chimney is reduced and the charted C.V. for the same quality of gas goes up. Since a non-luminous or only slightly luminous flame is used in the burner, this deposit cannot be soot, as is sometimes supposed. Examination of the deposit shows it to be chiefly inorganic material, in all probability composed of dust carried up with the ascending air current. There is little actual corrosion, as the products of combustion do not fall below their dew-point within the calorimeter.

The cap should be removed and brushed thoroughly about every fortnight or three weeks, and at the same time the chimney should be brushed out.

Effects of Draughts, &c., upon the Recorder.

The makers lay stress upon the point that the recorder should not be installed in a position where it is subject to draughts.

It is not possible to make a quantitative statement, but a cold draught may make a serious fluctuation on the chart, dependent upon the temperature and vigour of the moving air stream. Even when the circulating air is at room temperature, the direction of the draught is important, as the warm up current of air which surrounds the hot limb may be blown over towards the cold limb, and cause it to be heated-up. In a draughty situation, variations of ± 25 B.Th.U. are not unusual; and care must be taken to avoid such conditions. Recorders are sometimes placed near a window so that they may be visible to those concerned without the necessity for entering the testing-room. In such a case, a window upon which the sun shines is to be avoided. Owing to a difference in the disposition of the radiating fins and difference in the surface exposed, the hot and cold limbs are not equally affected by the sun's rays; and the chart shows a variation which may be considerable, but is not due to a change in gas quality. The same applies to the radiation from a gas-fire where one is used to warm the room in which the recorder is placed. In such a case, the fire should be on the side remote from the oil columns of the recorder.

The Chart.

A continuous roll-chart is used with the recorder; the ruled portion being 4½ in. wide, and divided to show every 10 B.Th.U. from 300 to 700. There is thus no zero on the chart. But a brass scale is fitted so that the chart can be correctly placed between its guides; and a zero mark is provided upon an extension of this scale, to which the pen can be set when the instrument is cold.

The chart is driven by a toothed wheel in the centre; and from time to time trouble is experienced from the chart being drawn over to one side, and being crumpled and held-up in the guides. Incidentally, the course of the small pricks of the toothed wheel can be followed down the chart, and used as evidence that the chart is keeping in its proper place between the guides. There is room for lateral displacement of the chart to the extent of ± 10 B.Th.U., on a number of charts examined. To accommodate charts the time-ruling of which may not be of the same pitch in all batches, the paper drive is provided with an expanding clutch drive, by which the chart may be accelerated or retarded, if it is losing or gaining on the clock supplied with the instrument. The dial of this clock is of doubtful utility; for the

time can be taken from the chart, and speeding-up or slowing of the chart could be effected by altering the pendulum of the clock, were it not for rendering incorrect the time shown by the dial.

TIME TO HEAT-UP AND COOL-DOWN.

When started all cold, the recorder requires at least an hour to become steady. Frequently it has been found to overshoot the C.V. of the gas by 5 or 10 B.Th.U., and then to fall to the correct value within the hour. This is accounted for by assuming that the maximum value reached is due to the full difference in temperature between the hot limb and the cold limb at room temperature, but that the cold limb subsequently becomes slightly warmed by radiation from the hot limb, leading to a drop in recorded C.V. The only means of checking the zero is by allowing the recorder to cool down; and at least two hours should be allowed for this process.

ACCURACY OF RECORDER AND RESPONSE TO VARIATIONS IN GAS QUALITY.

It has already been shown that the record is liable to variation with change in atmospheric temperature and pressure, with drop in water line of the meter, and when subjected to draughts. Care has been taken to exclude draughts, and the meter has been frequently water lined (daily or at two-day intervals). Spot tests have been made to compare the Junkers and Boys calorimeter with the Beasley chart; and it has rarely been found to differ from these (not corrected to 60° Fahr. and 30 in. bar.) by more than ± 10 B.Th.U. There is not yet sufficient evidence to say how closely the C.V. corrected for temperature and pressure agrees with the corrected results from the water-flow calorimeter, or whether there is a relation between such deviation and the tabular numbers. The calorimeter indicates changes in gas quality extremely well, as will be seen from fig. 15, showing a record obtained on the "make" stream of a small works making straight coal gas, where every charge and discharge of retorts is shown.

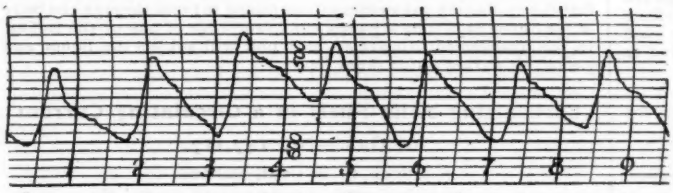


FIG. 15. *Chart from Beasley Recorder shewing response to very variable gas from Small Horizontal Plant.*

A comparison of records from the Beasley and the Simmance recorders appears at the end of Part I. of this report. [See fig. 12 on p. 750 of "JOURNAL" for June 29.]

SUMMARY.

BEASLEY RECORDER.

(1) The advantages of the Beasley recorder are:

(i.) Comparative simplicity of construction and operation.

(ii.) Absence of complication, because no water supply is required.

(iii.) Ready response to changes in gas quality.

(iv.) The gas rate is not dependent upon the quality of gas supplied to the recorder.

(2) Against this must be set certain disadvantages:

(i.) The record is liable to change with alteration in atmospheric temperature and pressure; and no attempt is made to compensate for these.

(ii.) There is no convenient means of setting or checking the chart, except by reference to an independent water-flow calorimeter.

(iii.) The instrument is sensitive to draughts.

(3) The instrument may be set to read gross or net C.V.; and no error of consequence will be introduced in the reading with gases down to 450 B.Th.U. gross, owing to change in composition giving rise to a different ratio of gross and net C.V. (See p. 101).

(4) Daily water lining is essential. In our tests there was a drop in the water line of the meter, due chiefly to evaporation, causing the meter to increase in capacity by approximately 1 p.ct. per day.

(5) Periodical cleaning of the chimney and cap of the hot limb is necessary, since the accumulated dust in these parts reduces the flow of air through the chimney.

(6) When steps have been taken to allow for, or overcome, errors due to evaporation in the meter, and draughts, the recorded C.V. agrees with the values obtained with the Junkers and Boys calorimeters (the results from the latter not being reduced to 60° Fahr. and 30 in. bar.) within ± 10 B.Th.U. Sufficient evidence has not been obtained to account for this difference.

(7) This recorder is, in our opinion, a useful instrument for the control of gas manufacture, but, from some errors to which it is liable, unsuitable for official purposes.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Amalgamation.

SIR,—A perusal of the lengthened list of Board of Trade Orders for standard therm prices cannot be made without leading to the conviction that we (gas companies) must not wait for Government to compel, but should ourselves initiate steps for "getting together."

Before the great work of the late Orwell Phillips and Sir George Livesey, the constant grumble of neighbouring consumers was that large disparity of their respective gas bills had no better foundation than an imaginary line along or across the street which was invoked by an Act of Parliament as a measure of the distance from cheap and dear gas. Can the rather exaggerated differences now existing be continued to the disadvantage of consumers, if any means are open to us for reducing, or even extinguishing, them? To-day's prices, exaggerated enormously from the normal, make it seem improbable that the works necessary to meet the ever rapidly-growing needs can be carried out reasonably for years to come. The business won't wait.

Bordering districts, with attenuated mains, can be often fortified immensely by connecting-up, while extended arterial mains are financially impossible. Facilities of water carriage is ever the cheapest and *à fortiori* by ships should be made available—especially under current rates, and with the hopelessness of rail economy. Surplus works can be employed profitably. Administrative expenses should be saved, and without injury to individuals, as Parliament sanctions quite liberal terms to officers and directors dispensed with.

But these, as a Northern engineer lately wrote me, must not stand in the way of public good, and still less, I think, in the way of the best development of our great industry, where combination can even do more than is hoped for in the railway and electric world, which you know is to-day the aim of the Government, as it ought to be of any wise administration. Are we to wait and get arduous terms of cohesion forced upon us, or shall we "get together" and develop the lowest price and the highest profit under the grand principle of the sliding-scale, which has done so much for gas the last 46 years?

I may return to this if any discussion be needed; but "*Now* is the appointed time."

HY. E. JONES.

Queen Anne's Gate, S.W., July 7, 1921.

Dust Deposit in a Hydrogen Plant.

SIR,—In connection with the sixth report of the Gas Investigation Committee's research, published recently in the "JOURNAL," your readers may perhaps be interested to know that about six months ago we had reported to us that the cause of a dust deposit containing mainly silica, on a water-gas plant used for the manufacture of hydrogen, was the formation at high temperatures of SiH_4 (silicomethane or silicon hydride).

It was found that the only way of reducing this silica dust trouble was to reduce the load on the plant. Evidently the tendency to form this gaseous compound between the silicon in the ash and the hydrogen from the steam increases with the temperature.

POWER-GAS CORPORATION, LTD.,
Stockton-on-Tees, July 8, 1921. N. E. RAMBUSH, Chief Engineer.

Field's Analysis.

SIR,—In view of possible further discussion in your columns, I am writing a demurrer against any greater alterations of our valued *Vade Mecum*, "Field's Analysis," than is rendered necessary by the new system of recording the continual testing of the quality and the prescribed basis of charge at per therm.

In point of fact, the real virtue of the change is the continuous test and record, which were not possible with photometric tests. If the latter tests could have been continuously made and tested, they still would not do, as from personal variations and complications they were never, though my experience of 45 years' daily work, found reliable. But for this advantage, we could have gone on charging for volume (as, indeed, we must always do), with a verified quality for heating purposes over the whole period charged for. Many of us have been selling calorific value for a number of years; but it could not be vouched as to its quality over the whole period, but had to be assumed to be of the quality ascertained by occasional, though frequent, tests in the Metropolis. There were practically none outside.

Bearing these facts fully in mind, what are we going to do differently—needing alterations of methods of accounts? Practically nothing, till the bill is sent to the consumer based on the recorded calorific value in therms of the gas shown on the meter and in all our books, works, accounts, and office. Then the accounting clerk, armed with the voucher of the calorimeter record, converts cubic feet into therms, and carries out the money value. N.B.—It might not be politic to put alongside the charge at per 1000 c.ft. of the newly attested gas. This last I hope Mr. Ibbs will do, as it will facilitate comparisons for old stagers like me.

But beyond this, what need be altered? As "Engineer" suggests, it might be useful, though troublesome, to the compilers to put in small red figures the therm costs and returns worked out from the declared (!!) value, as always before for illuminating power value. This will make the condemnation of failure in the ascertained value the more conspicuous, and the last columns of total cost and total revenue, where alone it need come in, will be the more quickly found by those to whom the book is a necessity of life (as a gas man). By no means let us wander from the path by which we have accumulated all our experience. It is not necessary—nay, it is useless.

Do not think I am under-estimating the enormous benefit the therm system confers by enlarging our scope of enterprise and of use of the materials that lie at our hands. I remember giving £3 a ton for

Australian boghead to enrich gas from coal at 10s., which without it could not be profitably burnt, except for the whitewasher who removed the surplus carbon from our ceilings.

Let us seize this in the light of our lately acquired strike knowledge, when anything over 420 B.Th.U. was most useful, and kept us alive!

Queen Anne's Gate, S.W., July 8, 1921. Hy. E. Jones.

How it is Done.

Sir,—In your issue of the 29th ult., "Engineer" again honours me with his criticisms. May I point out that in my letter to you in part answer to his previous remarks, I asked "Engineer" his authority for the statement embodied in the tables given in a previous letter that 60,000 c.ft. of 400 B.Th.U. gas (3 p.ct. inerts) were being obtained from a ton of coal in the plant he was then referring to? So far, this question has not been answered. If "Engineer" will be good enough to deal with this matter, I will then give him particulars of some of the methods by which three times the heat units can be sold for the same money. In my view, "Engineer" should deal with the reasonable comments I made on his previous communications before he can rightly expect me to answer further questions of his. My letters of April 9 and 30 last year, which you were good enough to publish, were written with some care; and they are just as much to the points raised to-day as they were then.

In August, 1916, when gas undertakings throughout the country were distributing a gas of about 550 B.Th.U., I went to the Government with the proposal that gas of 350 B.Th.U. net (400 gross), made by diluting straight coal gas in various ways and distributing it in the ordinary manner, would give practically as good a duty as 500 or 550 B.Th.U. gas as ordinarily made and distributed. So soon as these proposals were known to the gas industry generally, they were ridiculed. What is the position to-day. Have those people who have come down from 550 to 400 B.Th.U. found a proportionate increase in the consumer's bills? Have they found the proposal ridiculous? Let your readers search your columns for the answer to the question. I had put the matter to the test before I made the proposal, and no one else had done this. Now I have put these later proposals referred to by "Engineer" to the test before I make them, I am able to say that:

> Without restrictions as to composition of gas, I am able to undertake, in the average town gas-works, in this kingdom, worked on the principles existing in 1916, to manufacture and distribute roundly three times the therms for the same money with good service, and make the same or more profit. I am prepared to enter into guarantees to do it.

There is no gas undertaking that I am acquainted with (and I include some of the largest among them) that cannot sell three times the therms for the same money it is at present doing.

Nuneaton, July 6, 1921. Geo. Helps.

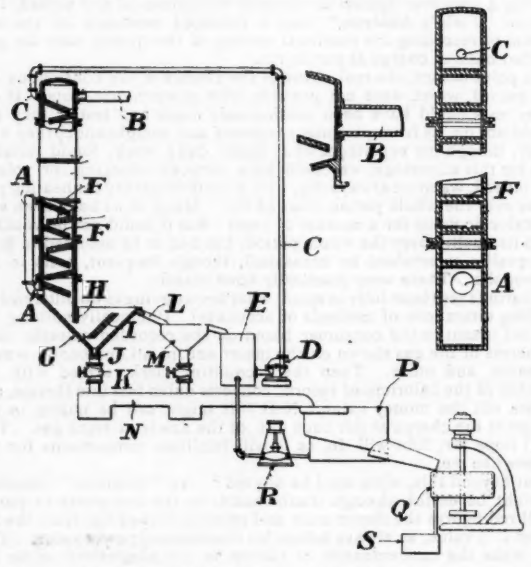
REGISTER OF PATENTS.

Ammonia Saturators.—No. 138,129.

American Coke and Chemical Company, of Chicago; Assignees of A. Roberts.

No. 2325; Jan. 24, 1920. Convention date, April 17, 1915.

An important object of this invention contemplates the removal of the sulphate salts from the saturator hopper without interference with the flow of acid and without interfering with the continuous operation of the saturator.



The Roberts Ammonia Separator.

A side elevation is given of a complete saturating plant (the saturating tower and hopper in cross section); also a fragmentary section of the whole tower, and a section of the upper portion of the tower on enlarged scale.

The saturator itself comprises a series of units; and the gas is delivered into the lower portion by a pipe A. After the gas has been treated in the saturator, it is discharged through the discharge pipe B. The sulphuric acid enters the upper portion of the saturator through the pipe C by the pump D, which draws the acid from the tank E. The acid travels downwardly over the faces of the baffle-plates F, back and forth from side to side of the saturator, eventually finding its way into the hopper G. The gas entering the saturator flows upwardly between the successive baffles to the discharge pipe, breaking through the acid adjacent to the edge of each baffle. Consequently, the gas is brought repeatedly into intimate contact with the acid.

The acid and the crystals entering the hopper G pass beneath the liquor seal or weir H; and the elevation of the liquor within the hopper is at all times sufficient to maintain this seal. Extending across the hopper, and parallel to its back wall, is a separator or baffle I, whose lower edge is spaced from the front wall a sufficient distance to allow the crystals to pass beneath the edge and into the upper end of the pipe J. A valve K regulates the delivery of crystals down the pipe, and also limits the delivery of liquor along with the crystals through the pipe. Most of the liquor finds its way out from the hopper G by way of the spout L, to be delivered into a supplementary hopper. Any crystals passing through the spout will collect in the supplementary hopper M, and pass thence to the shoot N under control of a valve. The liquor and crystals passing down through the pipe J also find their way on to the shoot. Most of the liquor from the supplementary hopper passes into the receiving tank E.

The shoot delivers the crystals ultimately to the draining table P, wherein the bulk of the liquor is separated from the crystals; the crystals going into the centrifugal Q, and the liquor collected in the lower portion of the draining table, to be thence returned into the tank E by means of the pump R. The dried crystals from the centrifugal are collected in the receiver S. All the liquor is delivered eventually to the receiving tank C, from which it is circulated back by a pump D through the pipe C into the top of the saturator.

Each unit of the saturator is preferably of rectangular cross section, having a pair of baffles F slanting down from one side and another baffle slanting down from the other side—the baffles alternating with respect to each other on the two sides. The baffles preferably extend substantially the full width of the saturator units, so that they completely close them with the exception of the open spaces at their lower edges. These spaces are so adjusted that they will be practically or entirely filled by the downflowing stream of liquor. By reason of this fact the up-flowing gas stream will be forced to break through the body of the liquor each time it passes the lower edge of one of the baffles. In the arrangement illustrated, each unit will subject the liquor and gas to this mixing action three times.

Carbonizing Solid Fuels in a Circulating Current of Gas.—No. 147,117.

Meyer, P., of Delft, Holland.

No. 19,151; July 7, 1920. Convention date June 29, 1918.

According to this invention, there is provided a process for the distillation and carbonization of solid fuels characterized by a volume of neutral gas being circulated through a furnace by admitting it into the underpart in a cooled state, passing it through a section of the fuel, and withdrawing it at a point in the length of the furnace for the purpose of heating it to a suitable temperature, reintroducing it at substantially the same point as it was withdrawn, passing it through the upper part of the furnace containing the remainder of the fuel, and thereafter exhausting it from the furnace.

The process is said to enable suitable fuels (such as lignite, peat, and wood) to be carbonized continuously on a large scale, and the final product obtained in a cooled state.

The re-heating of the current of gas up to the carbonizing temperature—preferably 300° to 350° C.—may be carried out in many ways. For instance, the gas may be withdrawn from the furnace after it has left the cooling zone, then forced through a heater of suitable construction, and finally introduced again into the furnace immediately below the carbonizing zone. In the case where the distilling process produces sufficient quantities of combustible non-condensing gas, the latter may be used for working the heater or the like.

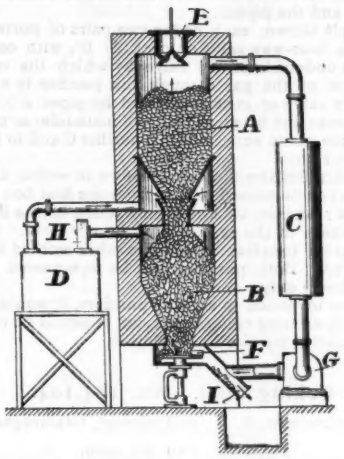
This method of working the process is simple and reliable; and, furthermore, the waste heat derived from working the heater may be used for drying the raw material in a suitable device. Also when re-heating the current of gas, a fresh supply of neutral gas may be added after the gas has left the cooling zone and before it enters the carbonizing zone, the temperature of which fresh gas must be of such a degree that the mixture of the two gases is at the required carbonizing temperature.

The current of gas is produced mechanically by means of blowers. As an increase in the quantity of the gases takes place continuously in consequence of the distilling process, a quantity of gas corresponding to this increase has to be drawn off at a certain point of the circuit. The pressure inside the furnace decreases in the direction of the current of gases—that is, from the bottom to the top. But the pressure difference inside the furnace can be controlled in a definite ratio to the pressure of the surrounding air by throttling more or less the exhaust opening for the gases. If the exhaust opening for the surplus gas is of sufficient dimensions, the pressure at this point of the circuit will correspond to that of the atmosphere.

This result may be obtained by using the discharge opening for the carbonized material as the exhaust opening for the surplus gas. In these circumstances it is not necessary to use a discharging device specially designed for preventing the admission of air into the furnace. However, the raw material must be fed into the furnace by means of a hopper with a double throat stopper, similar to those used on gas-generators.

If the charging and discharging openings of the furnace are each provided with its own closing device, both the openings may be alternately used as a gas exhaust, whereby the charging opening remains closed while carbonized material is being discharged, and, *vice versâ*, the discharging operation is stopped while the [furnace is being

charged. If the charging and discharging openings are closed, the system may be opened to the atmosphere at any point without fear of the air entering the furnace and endangering the carbonizing process.



Meyer's Process for Carbonizing Fuels in a Current of Gas.

The apparatus shown consists of two superposed furnace shafts A and B with a contracted portion between them, provided with a condenser C and a heater D. The charging hopper for the material to be carbonized is provided with a double closing device E; and the discharging device consists of a rotating table and a fixed scraper F.

The material fed through E is carbonized while sinking through the upper shaft, and is cooled in the lower one. A blower G sucks the neutral gas out of the upper shaft, through the cooling device C, and forces it into the shaft B. A second blower H draws the pre-heated current of gas below the contracted part of the shaft and forces it (the temperature of the gas having been raised in the heater D to the carbonizing temperature) into the shaft A above the contracted part. The purpose of this contracted part is to facilitate the withdrawal of the gas from the lower shaft and its introduction into the upper one.

The surplus gas generated escapes through the opening I, which at the same time serves as a discharge opening for the carbonized material.

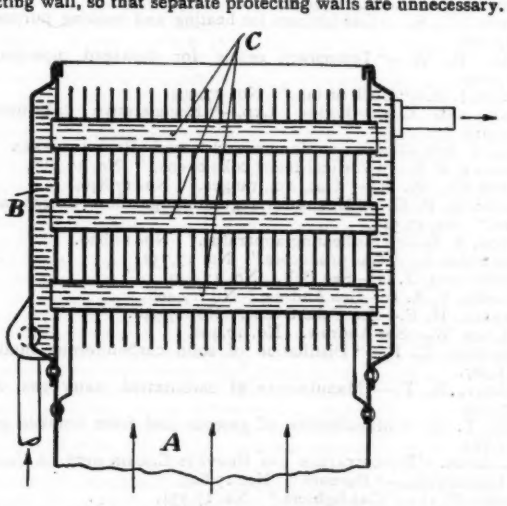
Preventing the Condensation of Moisture in Gas-Heated Apparatus.—No. 148,896.

JUNKERS, H., of Dessau, Germany.

No. 20,719; July 10, 1920. Convention date, March 31, 1919.

This invention is a modification of the invention described in patent No. 147,732.

It has been ascertained, the inventor points out, that condensation in such apparatus takes place not only in the heating flues or shafts but also on the walls of the heat-transmitting apparatus itself—especially in those places where it is not covered with ribs. For this reason, it is desirable to cover these parts of the wall with a protecting jacket also; "but such an arrangement is usually a difficult matter on account of the somewhat complicated construction of such heat transmitting apparatus." According to the present invention, the parts of the heater wall which are the most exposed to destruction through condensation are protected by shaping the radiator ribs nearest to these walls into a protecting wall, so that separate protecting walls are unnecessary.



A Junkers' Improved Calorimeter.

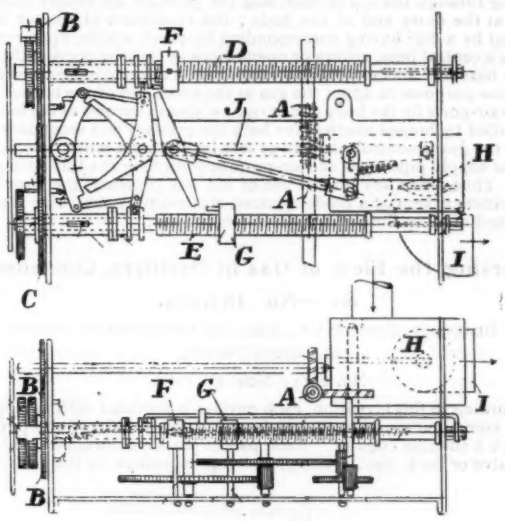
In the vertical section shown, the heat transmitting body of a heater for liquids is arranged in the upper part of the flue A. The liquid to be heated enters the distribution chamber B arranged on one side of the flue, is led across the stream of heating gases through pipes C, and is collected in a chamber D arranged on the other side of the flue, whence it is drawn off as required. The tubes or channels containing the liquid are provided with ribs which run in the direction of the gas current (shown by arrows). According to the ordinary construction of such appliances, the heating gases flow through the narrow spaces between the end ribs and the inner walls of the chambers B, D. As the latter walls (contrary to the channel walls) do not possess enlarged surfaces on the side exposed to the gases, their temperature becomes only very little higher than that of the liquid; so that on these walls condensation can take place, especially on walls containing the cooler liquid. According to the present invention this disadvantage is avoided by shaping the ribs adjoining these walls into protecting walls. As compared with the others, these ribs are somewhat elongated in the direction opposed to the current of heating gases, and their lower ends are so connected as to prevent the heating gases which rise up the flue A from entering into the spaces between. A detrimental overheating of the ribs is prevented by their thermal connection with the channels C containing the liquid.

Gas Meters.—No. 160,472.

ANNINGER, M., of Trieste.

No. 3611; Feb. 14, 1919.

This invention provides means for enabling variable quantities of gas to be distributed according to the consumer's requirements, by arranging to cut off automatically the supply of gas as soon as a predetermined amount has been consumed; the setting or changing of the apparatus being effected by the gas-works staff.



Anninger's Gas-Meter.

The movement of the shaft A of the meter is transmitted to the wheels B and C and the gear train of the two distributing groups. The wheels are loosely mounted and rotate continuously with the meter; while the shafts D and E are alternately rotated by coupling either of the wheels to the shafts. Two indicating scales (one for each of the two distributing groups) are provided on the front plate of the meter, and the index pointers corresponding with the scales travel in slots formed in the plate. A block F threaded on the shaft D carries the index spindle and a releasing pin; and a similar block G, which also carries an index spindle, is threaded on the shaft E. The shaft D is secured by a pin to a sleeve carrying a toothed disc, which can be displaced axially to engage with a toothed projection forming part of the wheel B.

The arrangement for causing the two distributing groups to work in sequence consists of collars and bell crank levers, one arm of each of which is connected to links, the free ends of which are connected to catch levers controlled by springs. The notches or ends of the levers co-operate with the ends of crank levers to prevent the shafts D E being coupled simultaneously with the shaft J.

As gas is consumed, the meter shaft turns the wheels B and C, the former of which is at the moment coupled to the wheel on the screw shaft D so that the block F moves towards the zero position; while the block G is still at the starting point to which it has been displaced by hand in setting-up the meter. As the zero position is reached, a pin on the block F will displace the collar, and with it the sleeve and the toothed wheel.

The latter is thus uncoupled from the wheel B, and the shaft D comes to rest. The displacement of the collar, however, involves the displacement of the bell-crank lever, and this causes the catch lever to be moved so as to release the lever, and so allow the spring, which was hitherto compressed, to couple the wheel C to the wheel on the shaft E. The consequence of these movements is that the shaft D is released from the wheel B and remains stationary, while the shaft E, now engaged with the main wheel of the meter, commences to actuate the block G towards its zero position.

Until both groups have moved in sequence to the zero position in the manner described, the shut-off valve H remains open as shown. The valve will close the outlet pipe I only when both the blocks have reached the zero position.

The closing arrangement for the valve H consists of a lever freely turning on its fulcrum, and guided by two slots [not shown] permitting the fulcrum to be displaced towards the left. The lever is connected by a rod to the crank, which controls the lever supporting the valve H of the outlet pipe. To hold the crank in the open position of the valve, a spring operates on the crank arm as shown.

The operation of the lever is effected by the two blocks when

one of them is at the zero position and the other is almost in it. The blocks are adapted to abut against the free ends of the lever, so that as the remaining block approaches the zero position the lever is pivoted about its end, engaging with the block already in the zero position. Thus the middle portion of the lever is moved and causes the closure of the valve. The lever cannot be displaced so long as one block is moving, because in such a case one end still remains free, and the lever is movable about its central fulcrum—that is to say, as the block G moves from the position shown it strikes one end of the lever, the other end of which is fulcrummed by the block F, and gradually closes the valve. When both blocks are in the zero position, for resetting the distributing groups it is necessary to release one of the shafts D or E.

Atmospheric Gas-Burners.—No. 162,332.

WEYMAN, J. E., of Newcastle-upon-Tyne.

No. 31,496; Dec. 16, 1919.

This invention relates to burners suitable for use with blast-furnace, producer, coke-oven, and the like gases, when used for fuel in connection with automatic air regulation, as described in patent No. 122,890. It varies from that arrangement in the position of the gas and air connections to the burner and the mechanism by which the air and gas are controlled at the burner.

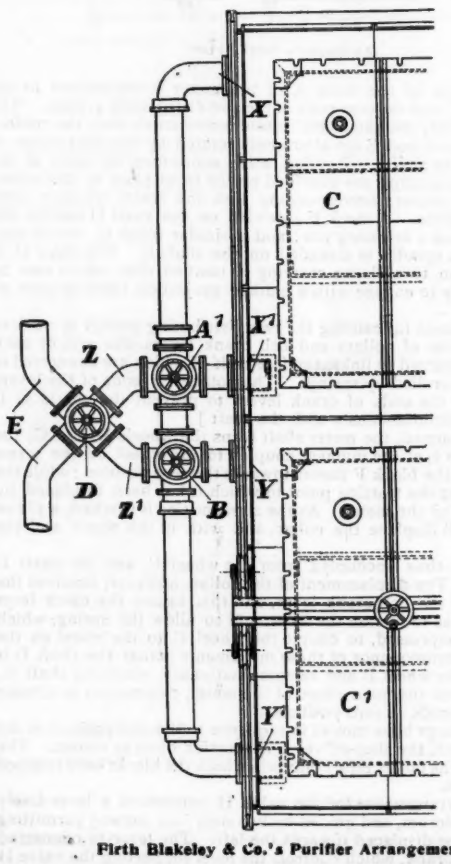
In the earlier patent is described a burner in which the gas is admitted at right angles to the axis of the burner by means of a bent pipe passing through the top or side, and the primary air supply through ports at the outer end of the body; the regulation of the air being effected by a disc having corresponding air-ports, which, upon revolving on a central boss, covers or opens more or less the ports at the end of the burner. In the present arrangement it is found more convenient for some purposes to admit the gas at the outer end of the burner, and to use air-ports (in the body and at right angles to the axis of the burner) controlled by hinged shutters for both the primary and secondary air; while the gas is controlled more or less by closing a butterfly valve in the gas supply pipe upon the air-ports approaching the full-open position. Thus, upon any further use of the gas pressure, the supply to the burners is kept at a predetermined maximum by the valve closing more and more as the pressure in the main rises.

Reversing the Flow of Gas in Purifiers, Condensers, &c.—No. 163,964.

FIRTH BLAKELEY, SONS, & CO., LTD., of Leeds, and BLAKELEY, W., of Church Fenton.

No. 7514; Nov. 15, 1919.

According to this invention, each purifier is provided with two ports, which communicate with an upper and a lower part of the purifier through a suitable conduit. Each pair of ports is controlled by a four-way valve or cock, having one of the four openings on the underside



Firth Blakeley & Co.'s Purifier Arrangement

or bottom of the valve by which the reversal of the direction of flow internally is effected. A third four-way cock may be connected to the other two and to the main inlet or outlet pipes, in order to reverse the flow externally.

This arrangement can be adapted to existing plant by the interposition of four-way valves in the inlet and outlet connections between existing valves and the pipes.

In the example shown, each of the two pairs of ports X X^1, Y Y^1 is controlled by a four-way valve or cock A^1 B^1, with one of the four openings at the underside of the valve by which the reversal of the direction of flow of the gas through the purifier is effected. D is a third four-way valve or cock connected by pipes Z Z^1 to the other two valves or cocks and by pipes E to the main inlet or outlet pipes, in order to cause the gas to enter at No. 1 purifier C and to leave at No. 2 purifier C^1, or *vice versâ*.

In this modification the direction of flow in either box can be reversed; the gas can be caused to flow from the first box to the second box, or *vice versâ*; and in an upward direction in the first box and a downward direction in the second box, or *vice versâ*. Either of the boxes can be cut-off for cleaning and the other worked forward or reversed as required. Both purifiers can be bye-passed if desired by working the valve D only.

In applying the invention to existing purifiers, it would be necessary to insert valves in existing connections, but it would be unnecessary to interfere with existing purifier centre-valves.

Coking Coal.—No. 164,104.

ILLINGWORTH, S. R., of Treforest, Glamorgan.

No. 6078; Feb. 28, 1920.

This invention, relating to the coking of coal, has for its object "to provide a better quality of coke for furnace purposes, by submitting the coal to preliminary treatment before the usual coking process."

According to the invention, the coal is submitted to a temperature below 400° C., out of contact with air, so as to destroy as far as possible all non-coke producing substances contained in the coal, but at the same time not to destroy all the resinic substances which are affected at a slower rate than the non-resinic substances. The quantity of resinic bodies must not be reduced below 5 p.ct. by weight of the residue.

It is preferred to conduct the process at a temperature below the minimum temperature at which the coal forms a coherent mass, so that a non-coherent residue is produced which can be charged directly into the oven for carbonization at 900° to 1000° C. If the higher temperature is employed, it is necessary to crush the preheated residue before coking.

Thus by the regulated preheating of coal (which if treated by ordinary processes would produce a porous coke), it is possible to obtain a dense hard coke—the degree of hardness and porosity being determined by the duration of the preliminary heating and the temperature employed.

The preheating may be conducted in a separate furnace—the material being transferred to an oven or furnace for carbonization; or it may be conducted in an oven heated to a temperature below 400° C., and subsequently to the higher carbonization temperature.

The heated gases evolved from a charge undergoing carbonization may be used for the preliminary heating; the gases being cooled to the required temperature and then passed through the charge of coal.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for July 6.]

Nos. 17,430 to 18,053.

ALLKINS, E. J.—"Gas-fires." No. 17,832.
ANDREW, J.—"Gas cooking-devices." No. 17,498.
BARNES, C. S.—"Gas-burners for heating and cooking purposes." No. 17,626.
BELL, E. W.—"Temporary repair for damaged pipe-union." No. 17,649.
BURNS, J. A.—"Cock or tap." No. 17,994.
COKE AND GAS OVENS, LTD.—"Regenerative coke-ovens." No. 17,940.
COLLIN AKT.-GES. ZUR VERWERTUNG VON BRENNSTOFFEN UND METALLEN, F. J.—"Vertical-retort coke ovens." No. 17,818.
CRANE CO., W. M.—"Gas, &c., ranges." No. 17,846.
DAVIDSON, P. G.—"Means for regulating gas-flow to gas-calorimeters." No. 17,545.
EATON, F. G.—"Gas heating-apparatus." No. 18,020.
FERGUSON, A.—"Gas producers." No. 17,732.
GREENWOOD, T. G.—See Bell. No. 17,649.
HUGHES, V. A. B.—See Andrew. No. 17,498.
KIMBELL, H. F.—See Coke-Ovens. No. 17,940.
M'LEAN, W.—See Andrew. No. 17,498.
MARKHAM, C. P.—"Distillation of solid carboniferous matter." No. 17,587.
MURRAY, E. F.—"Manufacture of carburetted water gas, &c." No. 17,879.
REID, T. A.—"Manufacture of gaseous fuel from limekiln gas." No. 17,873.
SOC. ANON. D'EXPLOITATION DES BREVETS COUSIN DITE LE CHAUFFAGE INDUSTRIEL.—"Burners." No. 17,825.
STACEY, F. C.—"Gas-lighters." No. 17,734.
STAVELEY IRON & COAL CO., LTD.—See Markham. No. 17,587.
STEWART, J. G.—"Apparatus for measuring the specific gravity of a gas, &c." No. 17,546.
SURFACE COMBUSTION COMPANY, INC.—"Mixing and proportioning gases." No. 17,482.
THOMSON, J. B.—See Allkins. No. 17,832.
YEADON, J. A.—"Stills for the continuous distillation of coal tar." No. 17,775.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

Progress of Bills.

The Rhymney and Aber Valleys Gas and Water Bill: Reported from the Joint Committee, with amendments.

The Batley Corporation Bill: Read a second time, and committed.

The Cardiff Gas Bill: Read the third time, with the amendments; passed, and returned to the Commons.

The Tendring Hundred Water and Gas Bill: Commons amendments considered, and agreed to.

The opposition to the Swansea Gas Bill having been withdrawn, it was committed.

The Radcliffe and Little Lever Joint Gas Board Bill: Returned from the Commons, with the amendments agreed to.

The St. Helens Corporation Bill: Reported from the Select Committee, with amendments.

The Colne Corporation Bill: Reported, with amendments.

HOUSE OF COMMONS.

Progress of Bills.

The Wandsworth, Wimbledon, and Epsom District Gas Bill: Reported, with amendments.

The Radcliffe and Little Lever Joint Gas Board Bill: Lords amendments considered and agreed to.

The Rhymney and Aber Valleys Gas and Water Bill: Report from the Joint Committee brought up and read.

The Waltham and Cheshunt Gas Bill, as amended: Considered, and to be read the third time.

Paisley Gas Provisional Order Bill.

A Bill to confirm a Provisional Order under the Burgh Police (Scotland) Act, 1892, relating to Paisley gas, was presented by Mr. Munro, read the first time, and referred to the Examiners.

WANDSWORTH, WIMBLEDON, AND EPSOM DISTRICT GAS BILL.

This Bill was considered by the House of Commons Unopposed Bills Committee, presided over by the Chairman of Ways and Means, on Thursday last. As originally deposited, the Bill provided for the transfer of the Sutton Gas Company's undertaking to the Wandsworth, Wimbledon, and Epsom Gas Company; but the provisions dealing with the transfer have been struck out. The proceedings in the House of Lords were reported in the "JOURNAL," April 20, p. 157.

Mr. LEES (Messrs. Lees and Co., Parliamentary Agents) said that the Wandsworth, Wimbledon, and Epsom District Gas Company was an amalgamation of three Companies, who, prior to 1912, supplied large areas in and around Wandsworth. The Companies were the Wandsworth and Putney, Mitcham and Wimbledon, and Epsom; and when the amalgamation was effected they preserved their separate limits of supply, which were known as the "Wandsworth limits," the "Wimbledon limits," and the "Epsom limits." At that time it was thought that the addition of the Wimbledon and Epsom limits would result in a considerable increase in the demand for gas; there being a great deal of room for development in these limits. In the circumstances, a bargain was made during the progress of the Bill in 1912 between the gas undertakings and the local authorities, as representing the consumers, which fixed the differential prices to be charged in the respective limits. It was provided that when the price of gas in Wandsworth was reduced to 1s. 9d. per 1000 c.ft., that in the other limits should come down to a greater extent; and when it got to 1s. 8d., the prices in the other limits should come down further still. The war, however, had knocked the bottom out of the whole scheme, as the Wandsworth limits could not possibly be supplied at 1s. 9d. or 1s. 8d. Therefore, the bargain being a statutory one, the Company had to come to Parliament to alter it. The anticipations in regard to an increased demand for gas in the Wimbledon and Epsom limits had matured—in fact, the demand in the Wimbledon limits had exceeded anything contemplated; and to-day more gas was supplied there than in the Wandsworth limits. Under the arrangement referred to, the Company were compelled at the moment to charge the Wimbledon consumers 7d. per 1000 c.ft. more than the Wandsworth consumers, and the Epsom consumers 1s. more, which was neither fair to the consumers nor to the shareholders. So the Directors had decided to ask Parliament to alter the extra 7d. in Wimbledon and the 1s. in Epsom to 5d. and 10d. respectively, with the further provision that if the Company satisfied the Board of Trade that the extra cost of the production and supply of gas in Wimbledon and Epsom was not as much as the 5d. and 10d., the 5d. might be reduced to 3d., and the 10d. to 9d. The Wandsworth Borough Council had opposed the Bill in the House of Lords, on the ground that it would involve a slight increase of price to the Wandsworth consumers; but the House of Lords Committee passed the Bill, and the Wandsworth Council had accepted that decision. The figures, however, were altered in the Bill to the equivalent amount per therm, because the Company had charged for gas on the therm basis since May 9, 1921, under a Board of Trade Order granted under the Gas Regulation Act, 1920. A copy of the Bill, as amended, had been sent to the local authorities of Wandsworth, Wimbledon, and Epsom; and they had all agreed that the figures were correct. The provisions with regard to differential price were contained in clause 6 of the present Bill, which provided that the price to be charged within the Wimbledon limits should not exceed by more than 1d. per therm, and the price charged within the Epsom limits should not exceed by more than 2½d., the price charged within the Wandsworth limits. The provision was also added that these figures might be reduced by the Board of Trade if the costs and charges for the production and supply of gas within the Wimbledon and Epsom limits were not as much as the figures quoted, provided that the price charged within the Wimbledon limits should not be less than ⅜d., and in the Epsom limits not less than 1¼d., per therm above the price charged in the Wandsworth limits. The Bill also sought power to erect additional gas-works on new lands adjoining the Epsom works, to increase the borrowing powers to half the issued capital, and to raise the unissued authorized capital of the Company, amounting to £289,478. Clause 10 of the Bill provided that the ordinary and preference stock of the Company might be issued, with the approval of the Board of Trade, direct to the consumers and to the employees. The price at which it was to be offered should be determined by the Chairman of the London Stock Exchange, but should not be more than 2 p.ct. below the average market price in the two weeks immediately preceding the offer. Before the war, the ordinary and preference stocks of public utility companies had to be sold by auction or tender; but a few gas companies, including the South Suburban Company, had obtained powers to issue stock direct to the consumers and employees. The drawback to issuing stock by auction or tender was that if the tenders hoped-for were not realized, the market price of the stock was reduced, and it had to be issued on worse terms. The provision asked for was similar to that obtained by the South Suburban Company, except that in that case the price was not to be more than 5 p.ct. below the average market price in the two weeks preceding the offer; whereas the Wandsworth Company only asked 2 p.ct.

Mr. *H. E. Jones* (Chairman of the Company) proved the preamble of the Bill, which was ordered to be reported for third reading as amended.

WIGAN CORPORATION BILL.

This Bill, which contains one or two clauses of a domestic nature dealing with the laying of pipes and mains by the gas undertaking of the Wigan Corporation, together with powers to borrow a further £20,000 for the purposes of the undertaking, was ordered to be reported for third reading by the Committee of the House of Lords presided over by Lord Ribblesdale last week. The proceedings before the Local Legislation Committee of the House of Commons were dealt with in the "JOURNAL" for May 18, p. 386.

Gas Appliances at the London Fair and Market.

Although of a very comprehensive nature, there is not a lot to engage the attention of the gas industry at the London Fair and Market, which opened at the Royal Agricultural Hall, Islington, on Monday of last week, and will close on Friday next. Perhaps the most noteworthy exhibit, so far as "JOURNAL" readers are concerned, is at the stand of Messrs. Curtis's and Harvey (associated with Nobel Industries, Ltd.). Here are seen working exhibits of the manufacture of the Company's well-known gas-mantles, together with raw materials in various stages of manufacture and samples of soft and collodionized ramie, silk, and cotton mantles, both upright and inverted, for high and low pressures. A knitting machine is at work showing how the yarn is made into "stockings" for the mantles. The processes of shaping and burning-off the mantles are also demonstrated. In regard to domestic apparatus, three firms are showing gas-cookers of the now familiar sheet metal variety. On the stand of the Pneuvac Company is the "National Economy" cooker, which has only one burner and is quite portable. Another type is shown by the British Sa Vall Company, and known as the "Cookall" oven. The patentee (Mrs. D. Cook) gives practical demonstrations of the apparatus. The oven (heated by a single burner having only fourteen small jets) is asbestos packed at the back; while fixed to the sides are rails, which may be utilized for drying tea cloths, &c. A separate burner is fixed on top for boiling purposes when the oven is not in use. A small and, it is claimed, effective combination griller and boiler, known as the "Grilette," is another feature of this stand. A combined boiler and cooker of more robust construction than the foregoing is on view at the stand of Messrs. E. Harper and Co., Ltd., of Bradford. In this the boiler is fixed at the side of the oven, on the top of which are two boiling rings; the boiler and cooker each being supplied by separate burners. Apart from the burners and fittings, galvanized sheet metal is used in the construction of this apparatus. Messrs. R. Joseph and Co., of Brixton, show the "Thistle" gas-saving kettle. This has fitted to it projections at the bottom tapering half-way up the side of the kettle for the purpose of preventing the gas-flame overlapping.

Waleswood Coking Company, Ltd.—A Company with this title has been registered to take over as a going concern the business of manufacturers of coke and residuals or bye-products of coal heretofore carried on by Skinner and Holford, Ltd. The nominal capital is £100,000 in £1 shares.

Grantham Gas Prices.—Controversey has arisen between the Grantham Town Council and the Gas Company regarding the latter's application to the Board of Trade for authority to levy increased charges. A report which was presented by the Lighting Committee at a meeting of the Corporation last Wednesday explained that the Company had suggested a maximum of 2s. per therm, instead of the present maximum of 5s. per 1000 c.ft., with an additional charge of 2d. per therm for gas supplied through prepayment meters. The Committee opposed the application on the ground that the charge was excessive; and the Board of Trade had made an Order fixing the maximum at 1s. 8d. per therm. The Gas Company were now proposing to charge 1s. 5½d. and 1s. 7d. per therm for gas supplied through ordinary and prepayment meters respectively. It was argued in the report (which was adopted) that under this scale a consumer through an ordinary gas-meter would pay at the rate of 5s. 10d. per 1000 c.ft., instead of 5s.

MISCELLANEOUS NEWS.

MALTA AND MEDITERRANEAN GAS COMPANY, LTD.

The Ordinary General Meeting of the Company was held on Tuesday of last week, at the London Offices, Nos. 59 60, Gracechurch Street, E.C.—Mr. A. F. PHILLIPS (the Chairman) presiding.

The SECRETARY (Mr. C. J. Daun) read the notice convening the meeting, and the certificate of the Auditors; and the Directors' report and the statement of accounts were taken as read.

The CHAIRMAN said he occupied his present position because their highly esteemed late Chairman, Colonel Clarke, who was leaving the country for a time, desired to resign his seat on the Board. It was a decision the members of the Board received with regret, because he had for many years so ably conducted the business. The position was an onerous one, because of the difficulties with the Italian business. His (the speaker's) colleagues, however, placed him in it, because they considered his experience with Italy would be useful. Whether they were wise or not, he could not say. To the vacancy on the directorate they had elected Mr. Frank H. Jones, a gentleman most experienced in gas engineering, and an able administrator. The Board were fortunate in obtaining such a colleague. Proceeding to move that the report and accounts be received and adopted, he remarked that the position of the Company was somewhat unusual. They had two stations—Malta which gave a reasonably satisfactory return, and Trapani in Sicily, the working of which resulted in a loss, and absorbed the profit which should be distributed as a dividend on the share capital.

RESCISSION OF THE TRAPANI CONTRACT.

He would first deal with Trapani, which gave the Directors so much trouble and anxiety. The total gas-rental for the year was only £2836 sterling—a miserable revenue from such a place. Coke brought in £257; charcoal, £409; meter rental, £55; and other receipts, £90—a total revenue of only £3649. The expenditure to earn this revenue was appalling. Coal, wood, and lignite cost £5243; wages and salaries, £701; repairs, £770; and other expenses were £368—making a total of £7082, and resulting in a loss on the year's working of £3433. The Directors had used every endeavour to get rid of this ruinous business. They applied to a Local Commission for a price for the gas that would prove remunerative, or for a rescission of the contract. They had a decision much in their favour; but the Municipality appealed to the Commission in Rome, and so the proceedings had dragged on for months, with interminable delay. The Board realized that if they were granted a price sufficient to make the business profitable, the gas would be too dear for the people to burn. They therefore desired a rescission of the contract, and to be entirely free of the business. He would not take the shareholders through the many troubles the Company had had in Sicily. Every endeavour had been made to convince the Commission in Rome of the impossibility of continuing the supply of gas; and the Company's claims had been most ably supported by their advocate. The Commission sent an expert to Trapani to examine and report on the works. The expert was able to report favourably; and he (Mr. Phillips) was pleased to inform them that the Board received a telegram a few days ago from their advocate, stating that the Commission in Rome had granted the rescission of the contract, subject to the Company's continuing the service for another three months. Great as the loss had been, the Directors contemplated with satisfaction the termination of their business in Sicily. They were, however, not yet free from annoyance as regards Marsala—another works they parted with early last year, and hoped they had heard the last of.

ITALIAN GOVERNMENT AND THE GAS INDUSTRY.

There was a matter to which he must allude, and in which he considered the Italian authorities had treated them shamefully, though many other gas-works in Italy were suffering in the same manner. When coal became most difficult to obtain, and it was not possible to supply gas at the prices fixed owing to the great increase in the cost of coal, wages, and all else required, the Italian Government, not wishing the gas to cease, made an offer of assistance if the supply was continued, which the gas undertakings considered acceptable. The Government agreed to supply the gas companies with coal at 165 lire per ton; the Government fixing the selling price of the gas and residuals on the basis that the gas-works should make no profit, but if any loss was sustained it should be reimbursed by the Government. The offer was made by the Italian Ministry of Munitions, and was accepted by the gas companies in good faith—it being termed working "*in pareggio*." This arrangement came into operation on April 1, 1917, and after working for a year was renewed in March, 1918, until Sept. 30, 1918, after which, as shipping was easier, the gas companies were requested to make their own arrangements for the supply of coal. The Ministry of Munitions then requested the gas companies to send in most elaborate statistics, which took a considerable time to compile, and put the companies to enormous trouble in preparation. Their Company owed the Government for coal 204,559 lire; on the other hand, the Government owed them for loss of revenue 204,848 lire. They had continually pressed the Government to agree the figure of the losses, and make them a payment. The Government, however, now contended that there was no law passed confirming the conditions of the "*pareggio*;" and they not only declined to give compensation for the loss sustained, but demanded payment for the coal supplied. It was most extraordinary behaviour on the part of the Italian Government. They were not treating the question correctly, but unjustly towards the gas companies. The British Commercial Attaché had taken the matter up; but as the Italian companies were being treated similarly to foreign companies, it was difficult for him to protest. The matter was being taken up by the gas industry generally in Italy, and would probably have to be decided in the Law Courts. It had been brought before the consideration of the Italian Parliament by the Senator Lucca, who pointed out all the facts connected with the "*pareggio*," which he considered justified the demand of the gas companies to be compensated for losses they had sustained. It was an obligation assumed by the State, who could not do less than carry out the undertaking they formerly accepted. It would be realized from this what a serious incubus the Sicilian business was to the Company, and how desirous they were of getting rid of it. Before the war, the consumption of gas at Trapani was 15,175,000 c.ft.; whereas last year the sale was only 8,492,000 c.ft. There was no alternative to getting rid of the works. In the hands of an Italian company with small capital, they might possibly be run at a profit.

SATISFACTORY RESULTS AT MALTA.

Now he would turn from this depressing business to one brighter, and in which the Board had great hope for the future. The results at Malta were satisfactory, and showed an improvement on the previous years, due to better working and a higher price for the gas. The gas-rental was £65,353, against £60,712 in the previous year, though the sale of gas was 15 million c.ft. less. Products only realized £20,347, against £22,507; less coal having been carbonized. The other receipts were much the same as in the previous year. Coal, oil, and coke for producing the gas cost £58,317 against £55,886; coal having been 43s. 4d. per ton more than for the preceding year. Wages and salaries were also much higher—£5361, against £3750. Repairs and maintenance cost £7571, compared with £4737. All other expenses remained much the same. The increased gas-rental was more than absorbed by the additional cost of coal, wages, salaries, and repairs. The working results were good. The gas made was 12,000 c.ft. per ton, and the coke *ex* retort-house 9·14 cwt. Considering the varying quality of the coal, this showed that the working had been ably directed and well controlled. There was every reason to have confidence in the business of Malta. Being a British Colony, there was no loss by exchange. The Company might look for increasing prosperity. Their relations with the public authorities there were at all times pleasant. The authorities had shown a disposition to help the Company in the difficulties they had to contend with. The price of coal had been very high throughout the year. At Malta, the lowest cost was £6 16s. per ton; and the highest, £8 16s. 6d., *plus* 3s. 6d. for unloading. At Trapani, coal ranged from 118 to 480 lire per ton; most of it being at the higher price, which after allowing for exchange, was about £6 per ton. At this station much wood and lignite were also carbonized.

BETTER TIMES AHEAD.

From the revenue account, it would be seen that the result of the year's working of the two stations was a balance of £8631 to carry to profit and loss, which, unfortunately, had to bear a loss of £4243 for exchange, which to some extent was due to the credits in former years at the Italian stations not having been written-down to the sterling value. After meeting interest on debentures, corporation profits tax, income-tax, and dividends paid during the year, there remained a balance of £3217, from which it was proposed to pay a dividend of 7 p.ct. on the first preference shares and 5 p.ct. on the second preference shares. This would absorb £3003 5s., leaving £214 4s. 6d. to carry forward. It was disappointing again to meet the shareholders without being able to recommend a dividend on the ordinary capital; but it must be remembered that the Company had passed through extraordinary times. Coal had been most difficult to obtain, and the price paid for it beyond all consideration. It was dangerous to say much of the future for such a Company as this, when Europe was still under so many political clouds; but there was a probability of the Company's position improving when they were rid of the wretched Italian business; and with coal cheaper as soon as they had recovered from the strike troubles in England, they would reduce the price of gas in Malta, and as a consequence increase the sale—resulting in a profit that would enable them to resume the payment of dividends on the ordinary share capital.

Mr. A. M. PADDON formally seconded the motion.

The CHAIRMAN, in reply to a question by Mr. DODGSON, said that Marsala had been written-off; but in the case of Trapani there might be some further losses to meet.

The report and accounts were then unanimously adopted.

The CHAIRMAN proposed, Mr. A. W. OKE seconded, and it was agreed, that dividends be paid for the year of 7 p.ct. (less tax) on the first preference shares and of 5 p.ct. (less tax) on the second preference shares.

The CHAIRMAN, in moving Mr. A. M. Paddon's re-election as a Director, remarked on the great value of that gentleman's experience, both as an engineer and from a legal point of view.

Mr. STRACHAN C. CLARKE seconded the proposition, which was agreed to.

Mr. PADDON, in returning thanks, said he had now occupied a seat on the Board for over twenty years; and the last few of these had not been pleasant ones. He thought, however, that there was now a better time in front of them; and he hoped they would soon see the Company back in the position which it had temporarily vacated, in the matter of dividends.

The Auditors (Messrs. E. L. Burton and William Cash) were re-appointed, on the motion of Mr. F. W. CHURCH, seconded by Mr. W. H. DODGSON.

Mr. DODGSON proposed a hearty vote of thanks to the Chairman, Directors, and staff, both at home and abroad. He said the shareholders much regretted to lose Colonel Clarke.

Mr. E. L. BURTON, who seconded, remarked that they were fortunate in having so eminent an expert as Mr. Phillips in the chair.

The CHAIRMAN's acknowledgment concluded the proceedings.

Gas-Workers Voluntarily Suggest Wages Reduction.—Alderman Witts (the Chairman of the Gas Committee) informed the Hereford City Council at their last meeting that the Gas Manager (Mr. Arthur Roberts) had intimated to him that the men employed at the gas-works had voluntarily held a meeting, and had stated that they would be quite ready to meet the Committee in the matter of a reduction of wages. He thought this was a very satisfactory statement to make, and one entirely to the credit of the men.

USE OF COKE-OVEN GAS.

Board of Trade Inquiry.

[FROM THE "BOARD OF TRADE JOURNAL," JULY 7.]

The interest which has been aroused during recent years in the conservation of our coal resorces has directed attention to the question of the efficient utilization of the gas evolved in the production of metallurgical coke. In normal times as much coal is utilized in the coke-ovens of the United Kingdom in the production of coke for blast furnace use as is carbonized in gas undertakings for the manufacture of town's gas. And as in the process of coking considerable quantities of a valuable gas are evolved—averaging in the case of bye-product coke-ovens 10,000 c.ft. per ton of coal carbonized, with a composition differing but little from that of ordinary town's gas before purification, and only slightly inferior to this gas in calorific value—it is evident that the best methods of using coke-oven gas are worthy of careful consideration.

A certain proportion of the output is absorbed in the heating of the ovens themselves; and this is possibly the most efficient use to which it could be put, although, as pointed out by Mr. Benjamin Talbot, it might, in certain circumstances, be advisable to replace the rich gas used for this purpose by blast-furnace gas when available, thereby setting free a larger proportion of coke-oven gas for other uses. The balance, varying from a small fraction up to one-half of the total gas evolved from the coal, is available for purposes external to the coke-ovens, either on the works themselves or for supply to outside firms.

SALES TO TOWN GAS UNDERTAKINGS.

For some years past endeavours have been made by certain coke-oven proprietors to find an outlet for the large quantities of gas which they have available for disposal; and to this end they have entered into contracts with gas undertakings in their vicinity to supply them with coke-oven gas for ordinary town purposes. The requirements of domestic and industrial consumers in a number of districts in the United Kingdom are at present being supplied in whole or part with coke-oven gas in this manner—among them being Birmingham, Leeds, Sheffield, Middlesbrough, Wath, Mexborough, Rotherham, Swinton, and Pontypridd; while gas undertakings in other municipalities are devoting consideration to the question of purchasing and distributing supplies of coke-oven gas.

With a view to facilitating such arrangements, section 10 (2) (*a*) of the Gas Regulation Act, 1920, expressly authorizes the Board of Trade to empower a gas undertaking to obtain supplies of gas in bulk for public distribution. There can be little doubt that the distribution of coke-oven gas for domestic purposes is an important step in the direction of national coal conservation, and probably the same statement applies in general with regard to its consumption for industrial purposes. By this means the coal consumption of gas undertakings will be appreciably diminished, and supplies set free for other purposes.

POWER USES.

As already indicated, coke-oven gas is utilized by proprietors of the ovens for other purposes than heating the coke-ovens themselves—for example, for steam-raising, for the supply of power in the works, and for use in gas-engines. In some cases a proportion of the gas evolved is supplied for power purposes to electricity undertakings; and in a few instances the gas is allowed to escape into the atmosphere and is entirely wasted. It is generally admitted that the burning of coke-oven gas under boilers is not the most efficient method of utilizing it; and other and more profitable outlets for the gas so consumed are being sought.

THE BOARD OF TRADE'S INQUIRY.

The Board of Trade have recently endeavoured to obtain information regarding the quantity of coke-oven gas produced in the United Kingdom and the proportions used for various purposes, or entirely wasted; and while it has not proved possible to procure complete returns, it is estimated that those received cover upwards of 85 p.ct. of the total number of bye-product coke-ovens now normally in operation. According to Prof. Bone, there were in November, 1917, approximately 8700 bye-product coke-ovens in operation in the United Kingdom, with a total rated carbonizing capacity of 17½ million tons of coal per annum; some 3500 being of the regenerative type, wherein the sensible heat of the burnt gas leaving the combustion flues is absorbed by chequer brickwork and later given out to the incoming air used for the combustion of further gas. Figures published by Dr. Hatch give the number of bye-product ovens in operation a year later as 8375. The statistics obtained by the Board of Trade during the present year relate to 7275 bye-product ovens, of which 3010 are regenerative; the total estimated carbonizing capacity being approximately 14½ million tons. But, as already pointed out, these figures are not complete.

OUTPUT AND EMPLOYMENT.

The output of gas per ton of coal carbonized varies from 9000 to 12,000 c.ft.; 10,000 c.ft. being the average quantity evolved, as shown by the returns obtained. The calorific values differ widely as between different coke-oven plants, and range from as low as 420 to as high as 550 B.Th.U. gross per cubic foot. In the case of ovens of the recuperative or waste-heat type, proportions varying from 66 to 100 p.ct. of the gas produced are used for the heating of the ovens, whereas the regenerative ovens require only 50 to 60 p.ct. of the gas output to maintain their temperature. The remaining gas is used for power production at the coke-oven works by steam-raising and by means of gas-engines, or is sold to neighbouring firms, or is entirely wasted. A total quantity of 37,250 million cubic feet per annum appears to be utilized by the coke-oven proprietors for purposes other than the heating of the coke-ovens, and a total of 7250 million cubic feet per annum, including upwards of 835 million cubic feet run to waste, is at present available for disposal, being in some cases already supplied to gas undertakings for public consumption.

It may be other and more economical methods of steam-raising will ultimately render available for other purposes a large proportion of the gas output not required for maintaining the carbonizing temperature. One of the possible uses to which spare gas might be put was indicated by the report of the Inter-Departmental Committee appointed towards the end of the year 1917 to consider the question of the employment of gas as a source of power, especially in motor vehicles, in substitution for petrol and petroleum products. The Committee recommended the use of town's gas and certain poorer gases, highly compressed in specially constructed cylinders, for motor fuel purposes; approximately 250 c.ft. of ordinary town's gas being equivalent to a gallon of petrol. It will be remembered that town's gas was employed in flexible containers for such purposes during the war; and although highly compressed gas did not come into general use in this connection, the London General Omnibus Company, Ltd., successfully conducted experimental runs with their omnibuses during the year 1919, in which town's gas compressed to 1000 lbs. and upwards per square inch was used as the source of power. Were it practicable to use coke-oven gas in this manner, the quantities mentioned above would represent respectively 149 million and 29 million gallons of petrol per annum.

SALE AND HIRE OF GAS APPARATUS.

Report under the Profiteering Acts.

As intimated in last week's issue of the "JOURNAL," there has been published, as a White Paper, a lengthy report upon an inquiry under the Profiteering Acts, 1919-20, by a Sub-Committee appointed by the Standing Committee on the Investigation of Prices, into the charges made for the sale and hire of gas apparatus. The members of the Sub-Committee were: Mr. G. W. Bailey (Chairman), Dr. Marion Phillips, Mr. S. D. Begbie, Mr. D. Carmichael, and Mr. F. Chitham. It should be particularly noted that, throughout the report, the word "stove" covers gas-cookers, gas-fires, geysers, and like apparatus.

Prior to the appointment of the Sub-Committee, a number of complaints had been brought to the notice of the Profiteering Act Department, which had their origin in the increases in the charges made by a number of gas companies towards the end of 1919 for the hire of gas-stoves. The passing of the Amendment Act of 1920 extended section 1 of the principal Act to cover the letting on hire of articles, as well as the sale of articles, and thus brought the hire of gas apparatus within the scope of the Acts. The most important of the complaints which had been made related to the Wandsworth, Wimbledon, and Epsom District Gas Company, and was made by the North Mitcham Improvement Association. The complainants stated that very little repairs were necessary to hired meters, stoves, &c.; that very few could have been fitted during the war; and that therefore an increase of 50 p.ct. was being made in the hire-rental of an article supplied and fitted at pre-war rates. They also stated that the balance-sheet of the Company for the half year ended June 30, 1919, showed an amount of £34,000 receipts from meters and appliances, and £20,000 for expenditure, leaving a profit of £14,000 made on an expenditure of £20,000, which appeared to the complainants to be a very large proportion of the sum available for dividends. The increase of the rentals of 50 p.ct. would, in their view, increase the profit for a similar half year to a maximum of £31,000.

In their inquiry, the Committee followed three separate lines of investigation. (1) They issued a questionnaire to ten gas undertakings, of which eight were gas companies in London and other parts of the country, and two large municipal undertakings in the North of England. (2) They heard evidence on behalf of the Wandsworth, Wimbledon, and Epsom District Gas Company and the Gas Light and Coke Company. (3) Their Chief Accountant undertook a detailed accountancy investigation into the books of the Wandsworth Company.

ANSWERS TO QUESTIONNAIRE.

Cost to Gas Undertakings of Stoves and Meters.—The answers to the questionnaire show that the average increase in cost in 1920 of stoves and meters to all the ten gas undertakings investigated was 144 p.ct. over the cost in 1913—*i.e.*, prices in 1920 were between two and three times pre-war prices. A great deal of this increase took place in 1920. Prices in 1919 were only 80 p.ct. in excess of 1913, as compared with 144 p.ct. in 1920.

Charges for Hire and Repair of Gas-Stoves.—There appears to be considerable variation in the practice of the different undertakings. One of the municipal undertakings to which the questionnaire was sent makes no charge for the hire and repair of gas apparatus; while the other charges on the basis of 10 p.ct. of the cash price of stoves as an annual rental, inclusive of fixing and repairs—meters being supplied free. Of the gas companies, one has retained the pre-war rentals unchanged, five have increased their rentals by about 50 p.ct., and two have increased stove rentals by 100 and 200 p.ct. respectively, in the case of new stoves.

Cost of Repairs and Renewals.—Three out of the ten undertakings were unable to give a figure for cost of repairs and renewals. In the case of the remaining seven companies, the increase in 1920 over 1913 varied from 50 to 300 p.ct. The average increase appears to be from two to three times the pre-war cost.

Number of Stoves Sold and Rented.—The answers show that, with the exception (owing to special circumstances) of the Gas Light and Coke Company, the numbers of stoves, &c., normally sold by gas companies are very small. The increase in the number of stoves rented has not been large since 1913. The chief increase was in the case of the Wandsworth Company, and was largely due to an extension of the area served by that Company.

Total Net Profit from Sale, Hire, and Repair of Gas Stoves, Meters, &c.—It is significant that only two out of the ten concerns were able to make a quantitative reply to this question. In the case of one company, pre-war surplus of £15,049 had been converted in 1919 into a deficit of £69,050; while the Gas Light and Coke Company stated that they had a loss in 1913 of £77,463, which had increased in 1919 to a loss of

£157,424. The Wandsworth Company stated that they were unable to reply to this question.

Price of Gas.—The average increase in the price of gas between 1913 and 1920 is 100 p.ct. In one company it is as much as 200 p.ct.; but in this case the pre-war price was very low.

Evidence on behalf of the Gas Light and Coke Company and the Wandsworth, Wimbledon, and Epsom Gas Company.

The Gas Light and Coke Company.—The following evidence was given by the representative of the Gas Light and Coke Company, who was also a member of the National Gas Council. In October, 1919, an increase of 50 p.ct. had been made by the Company on the pre-war rentals of stoves and meters, &c. When the Company notified their customers of their intention to increase rentals by 50 p.ct., they offered to sell outright the 270,000 stoves, &c., which they then had on hire, at less than half the price of new stoves. Under this offer, 100,000 stoves were bought. Even before the war, the aggregate rentals were not sufficient to cover the repair and maintenance charges, apart from interest on capital and depreciation. The 270,000 stoves, &c., on hire had cost the Company originally £905,000. The total rents received since the stoves were let on hire amounted to £1,700,000; while the total cost of repairs had been £2,015,347. As a result of increased cost of labour and materials, the cost of repairs increased by 170 p.ct. over the pre-war cost. In order to put stove-rents on a reasonably paying basis, the charges would have to be increased, not by 50 p.ct., but by 200 p.ct. This, however, would be contrary to the policy of the Company, which was to encourage as far as possible the sale of gas. If account were to be taken of depreciation and obsolescence, the deficit on gas apparatus would be still more marked. The average life of gas-fires was not more than seven years, and of gas-cookers sixteen years. The Company were writing-off their investments in gas apparatus out of general revenue at rather under 10 p.ct. per annum.

Evidence on behalf of the Wandsworth, Wimbledon, and Epsom District Gas Company.—The Committee examined witnesses representing the Wandsworth, Wimbledon, and Epsom District Gas Company with special reference to the complaint brought against the Company. The evidence was to the following effect: Owing to the form of the balance-sheet prescribed by the Gas-Works Clauses Act, 1871, the whole of the expense incurred in respect of gas apparatus was not brought together in the balance-sheet. Though the balance-sheet for the year 1919 showed not more than £49,828 for expenses of renewals and repairs of meters and stoves, the actual expenses in respect of gas apparatus were much heavier. Two-thirds of the expenditure under the item "Distribution of Gas" relates properly to stoves and meters. Depreciation at the rate of 10 p.ct. on the £350,000 invested in gas apparatus should be charged against the receipts therefrom. Further, interest on capital at 5 p.ct. must be reckoned a proper charge. Altogether a total of £127,000 could be estimated as representing expenditure, against which stood revenue amounting to not more than £75,000. Omitting interest and depreciation, the expenditure was £74,828. It was urged that these figures showed clearly that stove and meter users had been benefited at the expense of gas users, and that increased rentals were justified. The increase now made in rentals amounted to 100 p.ct. to new customers, and 50 p.ct. to old customers. Before the war, the rentals covered the whole cost of repairs.

Chief Accountant's Report on the Wandsworth, Wimbledon, and Epsom District Gas Company.

Having heard the above evidence from representatives of the Wandsworth, Wimbledon, and Epsom District Gas Company, the Committee were not satisfied that the Company were in a position from their accounts to throw full light on all the questions at issue without a much closer examination thereof than had been undertaken. They therefore instructed their Chief Accountant to make a detailed accountancy investigation into the books of this Company. The report of the Chief Accountant sets out in great detail the true position in regard to costs and profits attributable to the meter and stove sections of the business; and the facts elicited are summarized as follows.

Costs.—The costs of repairs and maintenance have increased considerably during the year 1919 as compared with pre-war years and with the year 1918. This is attributable mainly to increased wages and to the larger number of men employed in 1919, owing to the absorption of demobilized men. The hours of labour were reduced in May, 1919, from 50 to 47 hours per week. In addition to the increase in the cost of repairs per meter or stove, there was also an increase in the amount of repairs carried out. In 1918, 45 p.ct. of the total number of stoves on hire were repaired, fixed, or removed. This had increased in 1919 to 56 p.ct. of the total on hire. The labour cost for repairs and maintenance for each stove repaired rose from 6s. 2d. in 1918 to 8s. 11d. in 1919. The total expenditure on repairs, maintenance, &c., of stoves, meters, and automatic fittings increased from £33,953 in 1913 to £34,407 in 1918, and to £53,917 in 1919. An important contention made to the Committee in evidence by the representative of the Company was that depreciation at the rate of 10 p.ct. on the capital invested should be allowed against the profits from gas apparatus. Their Accountant has found, however, that depreciation is met in practice by means of the current repairs and renewals; so that, apart from the question of obsolescence, a stove or meter will be for all practical purposes in as good condition at the end of ten years as when it was new. If a stove has to be taken back into stock and repaired, &c., before it is leased out again, the cost of such work is charged to the repairs and renewals account, and is met out of current revenue.

The capital cost of meters and stoves was approximately twice as high in 1918 as in 1913, and in 1919 was two-and-a-half times the pre-war figure. It was these increases in cost of repairs and maintenance, and in capital cost of new stoves, which led the Company to increase the rentals in September, 1919, by 50 p.ct. to old, and by 100 p.ct. to new customers, and to charge an additional 2d. per 1000 c.ft. to users of automatic apparatus. The Committee quote in this connection the following paragraph from the report of the Chief Accountant:

> It appears that the actual figures for ascertaining what profits were being made on hiring gas-meters and gas-stoves were never ascertained, and that the general rise in prices and costs of repairs and maintenance alone decided the Directors in making the advances in rental charges.

Profits on Sale of Gas and Residual Products.—It will be seen that, so far as the main part of the business is concerned—*i.e.*, the manufacture and sale of gas and residual products—the rate of net profit off sales was 12·73 p.ct. in 1913 and 5·96 p.ct. in 1919; while the average for the seven years 1913-1919 was 7·94 p.ct. The net profit on the fixed capital investment in gas plant, mains, &c., was 6·87 p.ct. in 1913, 5·98 p.ct. in 1919, and an average of 5·3 p.ct. over the seven years 1913-1919. These figures do not include revenue or expenditure on account of meters, stoves, or automatic fittings.

Profits from Rentals of Meters, Stoves, &c.—The rate of profit earned off rentals of meters, stoves, and automatic apparatus was 29·3 p.ct. in 1913, 28·7 p.ct. in 1919, and 40·07 p.ct. on an average of the seven years 1913-1919. The percentage of profit on the fixed capital investment in such apparatus was 7·9 p.ct. in 1913, 8·2 p.ct. in 1919, and 10·28 p.ct. over the seven years 1913-1919.

It thus appears that during the seven years ended December, 1919, the average rate of profit on the capital invested in stoves, meters, and automatic apparatus was 10·28 p.ct., as compared with not more than 5·3 p.ct. on the capital invested in gas plant, mains, &c. The percentage figures in both cases are given before providing for obsolescence of plant, meters, stoves, &c.

Though the rate of profit on gas stoves, &c., in 1919, showed a decrease on the previous years, this is attributable to the fact that some of the repairs which had been held-up during the war were carried out in 1919. Part of the cost of repairs in 1919 should properly be allocated against the profits on rentals of gas apparatus made during the war, which were considerably in excess of the corresponding profits made in 1919.

The net profit on the manufacture and sale of gas and residual products amounted to £46,796 in 1913, and to £46,865 in 1919; while the net profit on rentals, &c., of gas apparatus amounted to £14,090 in 1913 and to £21,740 in 1919. Thus the profits on gas apparatus increased from 23·1 p.ct. of the total profits of the undertaking in 1913 to 31·7 p.ct. of the total profits in 1919.

The profits during 1919 cover three months of the increases in rentals, which were put in force in September, 1919. These increases consisted of (*a*) an additional 2d. per 1000 c.ft. of gas to be paid for gas consumed through automatic or prepayment meters; (*b*) an increase of 50 p.ct. in the rentals charged for gas stoves and meters to existing consumers; and (*c*) an increase of 100 p.ct. in the rentals to new consumers.

It was estimated by the Company that for the year 1920 the advance of 2d. per 1000 c.ft. to users of automatic meters and gas-stoves would bring in additional revenue of approximately £9750; while the increase of rentals by 50 and 100 p.ct. to old and new consumers respectively would produce an additional revenue of £11,350. Thus the receipts would be increased by about £21,000 in 1920. The Accountant estimates that out of the total revenue from rentals, &c., of gas apparatus in 1919, £5694 was attributable to the new increases. Without the new increases, the net profit from this source would have been £16,046, representing 6 p.ct. on the capital investment in gas apparatus and 25·5 p.ct. of the total net profit of the whole undertaking. It has already been pointed out that the return on fixed capital invested in gas-making plant, mains, &c., was not more than 5·98 p.ct. in 1919.

The Chief Accountant comes to the conclusion—and the Committee agree—that the increase of 2d. per 1000 c.ft. of gas consumed through prepayment or automatic meters, and of 50 p.ct. in the rentals of gas apparatus to old consumers cannot be justified solely on the basis of the increased costs of repairs, down to and in the year 1919, which are directly chargeable to gas apparatus. In other words, the justification for these increases must be sought mainly in the financial policy and results of the concern as a whole. The Accountant is, however, of the opinion—and the Committee concur—that the increases of 100 p.ct. in the rentals to new consumers who are supplied with new stoves or meters are justified by the increase of capital costs of new stoves and meters fitted during 1919 and afterwards.

General Conditions Prevailing in the Gas Industry.

In order to appreciate justly the action of the gas companies in increasing their charges for gas apparatus during 1919, it is necessary to consider the financial position of the gas industry as a whole, and in particular the influence of the war and of the statutory requirements with regard to price and dividend which affect gas undertakings. Gas companies before and during the war were divided into two main classes known as "maximum dividend companies" and "sliding-scale companies." The maximum dividend company had a statutory maximum price laid down for their gas and a maximum dividend which could not be exceeded. The sliding-scale company had a "standard price" and a "standard dividend" which might be paid by the company to their shareholders so long as they earned sufficient profit for the payment of such dividend, and were charging only the standard price to their customers. Any increase in the standard price subjected the dividend to a reduction, which was usually 5s. p.ct. on the capital for every 1d. per 1000 c.ft. increase on the price to the consumer; and, conversely, any decrease of price allowed of a corresponding increase above the standard rate of dividend for every 1d. per 1000 c.ft. reduction below the standard price to consumers.

This system of the sliding-scale, which first came into force during the period of 1875-1877, was almost always applied to companies seeking statutory powers subsequent to that period. It was designed with the double object of protecting the interests of gas consumers by securing the supply of gas at as low a price as possible, and at the same time helping to promote the careful and economical management and working of the undertaking by giving the company the inducement of an increased dividend above their standard rate, involving, as has been said, "a fine if they charge a high price and a reward if they charge a low one."

The war brought serious hardship to the gas industry; for, owing to the increase in the cost of coal, oil, labour, and transport, the cost of production of gas was greatly enhanced, and at the same time the price of residuals was controlled and kept low, with the result that prices of

gas had to be raised to a large extent. The effect of this on gas companies working under the sliding-scale was that the dividends payable to shareholders fell much below the "standard dividend," and were in a few cases even extinguished altogether. Parliament therefore granted relief by the provisions of the Statutory Undertakings (Temporary Increase of Charges) Act, 1918. Under this Act, when by the sliding-scale the dividend of a gas company has fallen to such an extent as to reduce it below three-quarters of the pre-war rate of dividend or of the standard rate of dividend, as the case may be, the company may obtain an Order from the Board of Trade authorizing them to charge such price as will be sufficient to enable them to pay the three-quarters rate of dividend.

A large number of companies working under the sliding-scale have taken advantage of the terms of this Act to escape for the time being from the automatic operation of the sliding-scale. It is, however, important to note that the Select Committee appointed in April, 1918, to inquire into the statutory prices of gas undertakings, expressly stated in their report that in their view the sliding-scale system has been a great success, and that it should be maintained in the future as the general principle upon which gas undertakings are managed. The facts just related have a distinct bearing upon the inquiry which the Committee were instructed to make into the charges for the hire of apparatus.

In cases where the sliding-scale is still in operation, it is possible for gas companies to raise large revenues from the hire of gas apparatus, and thus to avoid an increase in the price of gas which would result in a reduction in their dividend. The profits on gas apparatus of the Wandsworth, Wimbledon, and Epsom District Gas Company represented as much as 31·7 p.ct. of the total profits in 1919. When, however, the sliding-scale is put out of operation by an Order under the Statutory Undertakings (Temporary Increase of Charges) Act of 1918, any additional profits made in this way merely serve to enable a company to maintain or come nearer to three-quarters of the pre-war rate of dividend or of the standard rate of dividend without increasing the price of gas. The Wandsworth, Wimbledon, and Epsom District Gas Company did not obtain such an Order.

FINDINGS AND DECISIONS OF THE COMMITTEE.

Below are the findings of the Committee:

There were considerable variations before the war in the policy of gas undertakings in this country with regard to the charges to be made for the hire of gas apparatus. Some companies—and notably many of the municipalities—charged no hire at all, or only a nominal amount. In other cases, profits, which were sometimes considerable, were made from this side of the business of the undertaking. In general the policy was determined by the desire to increase, so far as possible, the sale of gas; and rentals were kept low for this reason.

During (and especially since) the war there has been a large increase in the cost of new stoves, meters, &c., and in the cost of maintenance and repairs. At the same time the cost of the production of gas has much increased; and there has been a decrease in the profits resulting from the sale of residuals.

These increases in cost, coupled with the operation of the sliding-scale in lowering dividends where the price of gas had to be raised, have caused gas undertakings to pay more attention to the charges they made for the hire of gas apparatus. In consequence, most gas companies in 1919 raised their rentals, as a rule by 50 p.ct. to old consumers, and in some cases by a higher percentage to new consumers.

From the evidence we have had before us, and as the result of the very thorough investigation of our Chief Accountant into the books of the Wandsworth, Wimbledon, and Epsom District Gas Company, we are of opinion that the increases in the case of that Company were due in part to a misapprehension on their part as to the cost and profits which up to the date of the increased rentals had been actually realized on that part of the business. It was stated to us in evidence by the representatives of the Company that they were making a very heavy loss on this account in 1919, after charging interest and depreciation; while our Chief Accountant found that in fact they were making a net profit of £21,740, before providing for obsolescence of meters and stoves—a provision which the Company do not appear to have made during any of the years under review. In drawing attention to this, we wish to make it clear that we exonerate entirely the representatives of the Company from any desire or intention to mislead the Committee. In our opinion they simply had not realized the true position. Since we took the evidence on which our report is based, the balance-sheet of the Wandsworth, Wimbledon, and Epsom District Gas Company for the year 1920 has been issued. The figures for repairs and maintenance of gas apparatus show a very large increase over the year 1919. The new figures probably include a considerable amount of deferred repairs which were not undertaken during the war years, and they must also include the advance in the cost of materials and labour experienced in greater degree that year. But it is impossible for us, without further investigation, for which the time at our disposal does not suffice, to ascertain the causes or nature of the increase in the costs shown under these heads.

We consider that, before the amount of net profits earned by gas undertakings from the rental of gas meters, stoves, &c., can be ascertained, an annual sum should properly be set aside, out of revenue, to provide for obsolescence of gas-meters and gas-stoves. The Chief Accountant's report on the investigation of the Wandsworth, Wimbledon, and Epsom District Gas Company's accounts states that records were not available to show to what extent obsolescence, in the form of meters, stoves, &c., which had become useless, had taken place in the seven years' period under review. Past experience would appear to be the only guide in determining the approximate sum which should be set aside out of profits earned to cover this item; and we therefore recommend that all gas undertakings should, in future, keep accurate statistical records of discarded meters and stoves.

We attribute the state of affairs referred to in the first part of finding (*d*) mainly to the fact that the statutory form of accounts prescribed by the Gas-Works Clauses Act, 1871, is such that it is not possible for gas undertakings to ascertain from their accounts thus kept, what are the total costs and profits arising from the hire and repair of gas apparatus as distinct from the rest of the business. It is, in our opinion, very desirable that the form of accounts should be amended in such a way as to permit of the costs and profits special to the different parts of the undertakings being separately shown.

Subject to the considerations previously dealt with as regards "old users" of gas apparatus, in view of the fact that the rate of return on the total capital employed on the whole of the business is very low, we do not consider that the increases in the rentals charged for gas apparatus can be said to have resulted in an unreasonable profit, when the business is viewed as a whole. We desire, however, to draw the attention of the Board of Trade to the possibility that in normal times, when the operation of the sliding-scale has been resumed, gas companies may, by means of the increased rentals for gas apparatus, secure such an increased revenue as will enable high dividends to be paid, while keeping the price of gas low. This would involve a differential charge against the users of such apparatus, who would be forced to subsidize large-scale consumers of gas. The gas companies would thereby be able to evade, to some extent, the intention of the sliding-scale regulations, at the expense, moreover, of a particular class of consumers.

MINORITY STATEMENT BY MR. D. CARMICHAEL.

The report is signed by four members of the Committee. Mr. D. Carmichael appends to it the following statement:

"I have read carefully the evidence submitted to me, and cannot sign the report, as I can see no justification for the great increase in the charges by the Wandsworth, Wimbledon, and Epsom District Gas Company, which in my opinion were excessive."

The full report on the investigation by the Chief Accountant's Department is included in the White Paper.

GAS OR ELECTRICITY FOR HOUSING SCHEMES.

Reports Submitted at Glasgow.

Reports have been received by the Glasgow Corporation from the General Managers of the Gas and Electricity Departments relative to gas and electricity supplies for housing schemes; and, commenting on these reports, Mr. Peter Fyfe (the Corporation Director of Housing) states that they draw attention to the extreme difficulty, if not the impossibility of laying-down the necessary gas mains or electric cables to serve the tenants of the new houses partially, and not wholly, with one or other of these elements, without financial loss. Mr. J. W. M'Lusky (the Gas Manager) puts it succinctly when he says: "In cases where the houses in the various schemes are lighted by electricity, and have a gas-cooker and wash-boiler installed, dual mains and services are necessary, with the result that neither of the Corporation's two departments has a profitable outlay of capital.

Mr. R. B. Mitchell (the Electricity Manager) supports this view, when he says: "It will cost a large sum to supply an area; and as the houses number only twelve to the acre, the capital expenditure involved is relatively large to the number of houses, and to the return for lighting only. Mr. Mitchell suggests a way out of the difficulty by the Housing Committee "assigning to the Gas Department one area to be all gas (with no electricity for lighting or other purposes), and to the Electricity Department an all electric area of similar size."

Each of the reporters points out that, unless a certain amount of gas or electric current is used in each house per annum, the standard or fixed charges cannot be met at present costs to the consumer—viz., 4s. 7d. per 1000 c.ft. of gas, and ½d. per unit of electricity, unless a certain minimum amount of the one or the other is used by each householder.

Taking a four-apartment house as an example, Mr. M'Lusky states that 26,000 c.ft. of gas must be consumed per house before any profit can be earned, and that, from the department's experience, about 4000 c.ft. of gas is consumed per house per annum for lighting alone, which, if deducted, leaves only 22,000 c.ft. as the consumption otherwise, involving a loss of 3·39d. per 1000 c.ft. of gas supplied.

Mr. Mitchell, on the other hand, points out that his department's fixed charge for a four-apartment house amounts to £4 11s., and that a years' consumption of 3250 units of electricity is the average in a four-apartment house, involving a further charge of £6 13s. 5d., or a total annual cost of £11 6s. 5d. to the consumer, against £5 19s. 2d. per annum for gas.

The question arises here: What is actually the average annual consumption of gas in an all-gas house? 26,000 c.ft. of gas is given by Mr. M'Lusky as an estimated average consumption; but it will be necessary to ascertain what is the average actual yearly consumption before we can have before us a fair comparison between the two systems.

For the purpose of ascertaining this, and finding out the views and opinions of the tenants of the houses in England where both all-electric services and all-gas services have been for some time in use, he suggested that a deputation from the Committees interested should visit and report to the Corporation.

The Housing Committee now recommend sending a deputation to see all-electric and all-gas estates in London and Billingham.

Coal Trouble at Ilkley.—At a meeting of the Ilkley District Council last week, Mr. W. Prest (the Chairman of the Gas Committee) said if a supply of 100 tons of Government coal, ordered last January, had been delivered, the total failure of gas supply the previous week would not have occurred. He paid tribute to the way in which the Committee and the Gas Manager (Mr. W. Everitt) had sought high and low for coal during the strike period. During April, at the increased price of 5s. 6d. per 1000 c.ft., they made a profit of £238, which was normal; but in May and June, owing to the high cost of coal and additional labour, there was a loss of £2552. If they were to carry on at the May and June rate, and pay their way but make no profit, they would have to sell gas at 13s. per 1000 c.ft. Mr. J. S. Hewitt said the work of the Gas Manager and staff had been superhuman.

GAS REGULATION ACT APPLICATIONS.

The following further notices have appeared in the "London Gazette" of applications by gas undertakings to the Board of Trade for Orders under the Gas Regulation Act.

Ascot District Gas and Electricity Company.

The statutory maximum price now authorized in respect of the supply of gas by the undertakers is 5s. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 1s. 10·18d. per therm.

Crediton Gas Company.

The statutory standard prices now authorized in respect of the supply of gas by the undertakers are 4s. 6d. per 1000 c.ft. within the urban district of Crediton, and 5s. within all other portions of the limits of supp'y; and the prices they have asked the Board of Trade to substitute are 2s. 0·28d. and 2s. 1·6d. per therm respectively.

Luton Gas Company.

The standard price now authorized in respect of the supply of gas by the undertakers is 4s. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 19·2d. per therm.

Sheppey Gas Company.

The maximum prices now authorized in respect of the supply of gas by the undertakers are 4s. 6d. per 1000 c.ft. within the present limits, and 7s. 6d. within the extended limits as defined by their Acts; and the prices they have asked the Board of Trade to substitute for these are are 21d. and 28·5d. per therm respectively.

Weymouth Consumers' Gas Company.

The maximum prices now authorized in respect of the supply of gas by the undertakers are 4s. per 1000 c.ft. within the parishes of Weymouth, Melcombe Regis, Wyke Regis, and Radipole, and 4s. 6d. in the parishes of Upwey and Broadwey; and the prices they have asked the Board of Trade to substitute for these are respectively 1s. 7·6d. and 1s. 8·8d. per therm.

DECLARATION OF CALORIFIC POWER.

Whitworth Vale Gas Company.—475 B.Th.U. (July 3)

SPECIAL ORDER.

Newport (Mon.) Gas Company.

The Company are applying for a Special Order to extend their limits of supply; to enable them to purchase residual products from other gas undertakings; to pay an increased dividend on unissued stock; to increase their borrowing powers; to issue redeemable preference stock; to hold annual meetings; and to establish co-partnership schemes.

GAS REGULATION ACT ORDERS.

Copies have been forwarded by the Director of Gas Administration of the following further Orders made under section 1 of the Gas Regulation Act. The parts applying specially to the Companies named, and the dates of coming into operation, are noted.

Bishop's Stortford, Harlow, and Epping Gas and Electricity Company.

After the declared date—(*a*) the standard price in respect of gas supplied by the undertakers shall be 2od. per therm; (*b*) the sum of 2·4d. per therm shall be substituted for the sum of 1s. per 1000 c.ft. in subsection (4) of section 61 (price of gas) of the Bishop's Stortford, Harlow, and Epping Gas and Electricity Act, 1910; (*c*) the sum of 18·8d. per therm shall be substituted for the sum of 3s. 6d. per 1000 c.ft. in section 62 (limitation of price in Ongar district) of the Act of 1910, and "per therm" shall be substituted for "per 1000 c.ft." in the section.

For the purpose of ascertaining the authorized rate of dividend for the half year in which the declared date occurs, the price charged per 1000 c.ft. during that part of the half year (if any) before the declared date shall be rendered into the equivalent price per therm by dividing it by four-and-one-fifth.

Prepayment meter clauses are included. (June 28.)

Burnham Gas Company, Ltd.

As from the declared date, the maximum price in respect of gas supplied by the undertakers shall be 19 8d. per therm. (June 27)

Slough Gas and Coke Company.

After the declared date—(*a*) the standard prices in respect of gas supplied by the undertakers shall be 17d. per therm and 17·6d. per therm; and these prices respectively shall be substituted for the prices of 4s. 5d. and 4s. 8d. per 1000 c.ft. mentioned in subsection (2) of section 35 (repeal of section 12 of Order of 1898—dividends dependent on price charged) of the Slough Gas Act, 1913; (*b*) the sum of 0·6d. per therm shall be substituted for the sum of 3d. per 1000 c.ft. mentioned in the first proviso to the subsection.

For the purpose of ascertaining the authorized rate of dividend for the half year in which the declared date occurs, the price charged per 1000 c.ft. during that part of the half year (if any) before the declared date shall be rendered into the equivalent price per therm by dividing it by five. (July 5.)

Wellingborough Gas Light Company, Ltd.

After the declared date, the standard price in respect of gas supplied by the undertakers shall be 15·4d. per therm.

For the purpose of ascertaining the authorized rate of dividend for the year in which the declared date occurs, the price charged per 1000 c.ft. during that part of the year (if any) before the declared date shall be rendered into the equivalent price per therm by dividing it by five.

The sums of 2·4d. per therm and 17 8d. per therm shall be substituted for 1s. and 5s. per 1000 c.ft. in section 7 (price of gas within extended limits of supply) of the Wellingborough Gas Order, 1890. (July 4.)

SPECIAL ORDERS.

Havant Gas Company.

Prints have been issued of a draft Order proposed to be made by the Board of Trade under section 10 of the Act, providing that the Company may, notwithstanding anything contained in the Havant Gas Act, 1910, in accordance with that Act borrow on mortgage any sum or sums not exceeding in the whole (including any moneys already borrowed) £11,000, whether the whole of the share capital shall have been paid up or not. Any preference capital issued in accordance with the provisions of the Act of 1910 may be issued at such rate of dividend, not being more than 8 p.ct. per annum, as the Directors may think fit. The Company shall not, without the consent of the Board of Trade, pay interest at a higher rate than 6½ p.ct. per annum in respect of any money borrowed on mortgage or any debenture stock to be issued under the authority of the Act of 1910 or this Order.

Hindley Urban District Council.

A Special Order is proposed to be made by the Board of Trade enabling the Council to purchase from other gas undertakings and work-up residual products; to purchase in bulk crude, partially purified, or wholly purified gas; to lay pipes for ancillary purposes; to specify the size and material of pipes and fittings; to make a minimum charge for gas laid on to premises having a supply of electricity or power gas; to otherwise regulate the supply of gas; and to borrow an additional sum not exceeding £20,000. There are clauses for the protection of the railway companies concerned.

The provisions relating to the size and material of internal pipes and fittings, &c., are as follows:

> The Council may specify the size and material of the pipes, with the fittings thereof, which are to be laid by the consumer on his own premises, either in the first instance or on the occasion of any renewal between the Council's mains and the meter so far as such pipes and fittings are intended to be covered over.
>
> The Council may, if they think fit, make different specifications for different classes of premises, having regard to the probable maximum consumption of gas thereon at any one time.
>
> The specification shall be published once in each of two newspapers circulating within the limits of supply, and a copy thereof shall be kept exhibited in the office of the Council.
>
> Every meter to be used in a new building or a building not previously supplied with gas, or in connection with a new or substituted pipe laid by the consumer between the main and the consumer's meter, shall be placed as near as reasonably practicable to the Council's main, but within the outside wall of the building.
>
> When any such pipe or meter as aforesaid has been laid or placed, notice thereof shall be given to the Council, and the pipe shall not be covered over until after the expiration of twenty-four hours from the service of such notice on the Council. Any officer of the Council duly appointed may between 9 o'clock in the morning and 5 o'clock in the afternoon, attend and inspect such pipes with their fittings and meter; and if the officer is not permitted to make the inspection, or if the pipes or fittings are not according to the Council's specification, or if the meter is not placed as required by this section, the Council may refuse to supply gas to the premises until the provisions of this section have been complied with.
>
> Any person to whom the Council refuses a supply of gas under the provisions of this section may appeal to a Petty Sessional Court against such refusal; and the Court may, after hearing the parties and considering any questions as to the reasonableness of the Council's specification, make such order as seems to them proper in the circumstances, and may order by which of the parties the costs of, and incident to, the appeal shall be paid.

HOW SHEFFIELD CARRIED-ON.

The following statement as to how the Sheffield Gas Company carried on during the coal strike has appeared under the heading of "Foresight Rewarded," in the "Sheffield Independent."

Now that the coal needed for industry is again being obtained from the proper channels, a review of the way in which Sheffield carried-on during the coal war discloses that the city fared much better than other large centres. It is doubtful if any city or town in the country was better equipped to meet the lengthy stoppage than was Sheffield, particularly with regard to the gas supply. Knowing the facts, the public will no doubt readily concede that the management of the Sheffield Gas Company deserve every commendation for their foresight and business acumen, and the skilful manner in which the undertaking was steered through a very trying time. When the stoppage occurred on April 1, the Gas Company planned so well that they had in stock sufficient coal to carry them right through to the peace without having to obtain any foreign coal; and though a supply was obtained from some of the collieries during the stoppage, events proved that the Company could have carried-on without it. They had great stocks at Neepsend. With the exception of the restriction as to power, imposed nationally, there was no restriction in the quantity of gas until the last few days of the coal war, when there was a slight drop in the pressure; but consumers were never deprived of a supply of gas at any time during the 24 hours of a day. This was all the more creditable to the management when it is remembered that the Company not only supplies Sheffield, but all the surrounding district as far as Stocksbridge, Ecclesfield, Chapeltown, Grenoside,

and Dore. It was the desire of the Company, from the Chairman of Directors downwards, to see that the public of Sheffield were saved from inconvenience during the stoppage of the pits; and that they managed this without having recourse to foreign supplies of coal will be greatly appreciated by consumers. It may be recalled also that for some time past the Company's mains have been linked-up with the coke-ovens of one of the big local collieries from which source the gas supply has been considerably augmented. But, of course, this was cut-off when the pits stopped working. Another commendable feature in Sheffield was that the Company continued to supply gas coke in large quantities to the public, and to the Corporation electric power stations throughout the period of the dispute until about a fortnight ago.

EXPERIENCES OF THE STRIKE AT LEEDS.

One of the greatest triumphs achieved in Leeds over the difficulties occasioned by the miners' strike, says the "Yorkshire Post," has been the uninterrupted efficiency of the gas service. For this great credit is due to certain enterprising members of the Committee, to the Engineer and General Manager of the Department (Mr. C. S. Shapley), and his chief officials, and last, but by no means least, to the loyal and zealous co-operation of the staff. The Leeds supply was in pre-strike days augmented by coke-oven gas from the Middleton Collieries; and the cessation of this auxiliary supply made the situation more difficult. The crisis had not been entirely unforeseen; and considerable reserves of coal had been accumulated in all sorts of unsuspected hiding places. The water-gas plant was also available as a valuable stand-by. The time came, however, when all the odd parcels of coal, including outcrop and other local contributions, failed. Then the Committee managed to get in some Belgian coal—very poor stuff, but valuable inasmuch as it enabled the works to keep going. Since then Canadian coal has been coming in. It is quite good coal; the only disadvantage being its high cost in the works. Canadian coal is still coming along, and will be used to tide-over the period until the normal deliveries from the collieries are resumed.

BELFAST GAS UNDERTAKING.

The Annual Report.

The annual report of Mr. J. D. Smith, the Engineer and Manager of the Belfast Gas-Works, presented to the Corporation on the 1st inst., stated that the gross profit on the manufacture and sale of gas residuals was £36,598, being a decrease of £39,051 as compared with the previous year. Adding other items of profit brought the total gross profit up to £37,038. After deducting £16,173 for income-tax, £17,774 for dividends and interest on capital, and £9910 equivalent of interest on redeemed stock, a net loss is shown of £6825—a decrease of £48,436 compared with last year's net profit.

The period under review was the worst experienced for a long time past. Costs continued to increase steadily; but in spite of this it was decided not to further increase the price of gas. With the expected drop in the cost of coal and other materials, it was hoped a brighter report might be presented next year. The gas made amounted to 3197 million cubic feet, an increase over last year of 144 millions, equal to 4·71 p.ct. Of this quantity, 2643 million cubic feet was coal gas and 734 millions water gas. There was an increase over the previous year of 9·95 p.ct. of coal gas and a decrease in water gas of 9·70 p.ct. The percentage of coal gas over the whole year was 77·03, and of water gas 22·97. The quantity of coal carbonized was 167,013 tons, the cost being £446,974, an increase over the previous year of 19,117 tons and £112,232. The gas made per ton of coal was 14,749 c.ft. This was slightly lower than last year, owing to the poorer quality of coal. The average price—53s. 6d. per ton, compared with 45s. 3d. last year—largely accounted for the heavy increase in cost of supplies. The extra cost of coal alone amounted to 9·15d. per 1000 c.ft. of gas sold. Carbonization costs rose considerably; the increase over previous year being £3743. Boiler fuel increased by £1518, and purification by £2344. Repairs and maintenance increased by £14,473, caused principally by wages and materials. The cost of oil was reduced by 1·843d. per gallon; and as they used only 896,082 gallons, as against 928,264 gallons the previous year, the total reduction in oil cost was £13,089. Water-gas manufacture cost had, as principal increases: Coke and wages, £15 087; boiler fuel, £1371; purification, £2629; and repairs, £1030. Distribution charges also rose; the principal increases being: Repairs of mains £1329, services £913, meters £388.

The year's total in wages was £153,232, an increase of £38,253, equal to 33 p.ct. over last year. Salaries for the year amounted to £49,953, an increase of £10,391, equal to 31 p.ct. over last year.

On the revenue side, there was an increase of £21,629 in the sale of gas through ordinary meters, and of £1406 through slot meters, a total of £23,035. The price of gas for the first quarter was 3s. 4d. net; but, owing to the increasing cost of coal, the price advanced to 3s. 8d. on July 1, 1920. The sales of coke and breeze produced an increase of £84,082 over the previous year; while an additional revenue of £7794 was obtained from tar and ammoniacal liquor.

The stove department showed a profit of £257, a decrease on the previous year of £1692, accounted for by heavy charges of cost of materials and wages, &c. The stoves sold outright showed an increase of £2608, and of cookers on hire 527. New condensers and exhausters had been erected; and the purifiers and station meter would shortly be finished. Contracts had been let for a gasholder of 7 million cubic feet capacity, and for a gasholder tank; and the works were making good progress.

Mr. H. M'LAURIN, in moving the adoption of the report, said the deficit, although regrettable, was anticipated; and the Committee had feared it would be even larger. The reason was that they did not wish to raise the price of gas. In a return to which he referred, he found that Belfast was the lowest; Dublin being 7s. 6d. against their 3s. 8d. The Committee had decided to establish a meter-testing station in Belfast.

Alderman BOYD seconded the motion, which was adopted.

LINCOLN'S IMPORTANT EXTENSIONS.

Though the engineering industry, upon which the city mainly relies, is still in a very unsatisfactory state, and productive works generally in a condition of unwonted depression, the Lincoln Corporation, at their meeting on Tuesday of last week, decided, in pursuance of a forward policy, to undertake large improvements in connection with the gas undertaking, for which, with a return to normal trade conditions, there will be adequate need.

It was pointed out by Alderman Wallis, in moving the adoption of the report, that, during the 34 years the Council had had control of the undertaking, no money had been borrowed for improvements; and the Committee had now about £38,000 in hand. When the war broke out, there were some things which the Committee were not able to do, because they desired to save a little more money with which to carry out the work at an opportune time. The Committee were not in favour of scrapping the Newland gas premises, and recommended that £8000 should be spent on new purifiers there. It was in contemplation also to spend £7000 on a gasholder. There was the water-gas plant at Bracebridge to be dealt with; and there they were putting-down a new small plant which he believed would prove a step in the right direction. Altogether the Committee desired to spend £25,000 during the next year or two; and they would then be able to carry on there for eight to ten years, which was far enough to look ahead.

NEWCASTLE GAS SUPPLY AND THE STRIKE.

Now that the miners dispute has been settled, the "Newcastle Chronicle" has recalled the experiences of the Newcastle and Gateshead Gas Company. The writer remarks that, when the usual sources of supply are cut off for about thirteen weeks, during which, in the ordinary course of events, about 80,000 tons of local coal would have been required, some idea will be formed of the immensity of the task of finding substitutes to meet in some measure the demands of about 130,000 consumers of gas in the Company's area of supply. The Directors decided that, at all costs, a supply of gas should be maintained, at any rate for domestic and other essential purposes, especially when other fuel was almost unobtainable. They purchased large quantities of oil; and one-half of the total quantity of gas supplied during the coal stoppage was manufactured from oil and coke.

The Company purchased, jointly with the Electric Supply Company, some cargoes of Durham coal lying in vessels in the Tyne and Wear, which had been prevented by the Government from leaving these rivers at the outset of the dispute. The countryside was scoured, and coal heaps that had hitherto been despised were conveyed to the gas-works by road—an immense task. Later, some cargoes of foreign coal were purchased at huge prices, and with very poor results. When it is said that the worst of English gas coals produce something like 10,000 c.ft. of gas to the ton and some of the foreign coal gave as low as 5000 c.ft. per ton, it will be recognized that the Company's engineering staff and workmen had an anxious and laborious time. The cost of the coal was in some cases three times the price usually paid; and no coke was obtained from it, with the result that the Company were some shillings out of pocket on every 1000 c.ft. sold. Owing to the foreign coal producing in some cases no coke and in others very little, the Company had to purchase, for use in the gas-works, some hundreds of tons of coke-oven coke at about double the price at which they had been supplying gas coke to the public. The many thousands of consumers must appreciate the great difficulties and the enormous expense under which the Company had carried on during the past few months.

Mr. T. P. Ridley, the Secretary of the Company, stated that it would take a little while before the gas-works could be got into normal condition again; but the pressure of gas would be increased gradually at the earliest possible moment.

ANNUAL REPORT AT CHORLEY.

In his third report to the Chorley Corporation Gas Committee, dealing with the working results for the year ended March 31, Mr. Mark Newsome (the Engineer and Manager) says the total receipts amounted to £55,744, and the expenditure to £47,350, leaving a gross profit of £8393, as compared with £10,386 for the previous year. After meeting interest, sinking fund, and depreciation charges, there is a net loss of £2088 on the year's working, as against a net profit for the year before of £984. It should be remembered, in considering this adverse balance, that much extraordinary expenditure has been met. During pre-war years, the meters were renewed at the expense of the capital account, and the retort-settings out of the depreciation account. The war period prevented any but the smallest expenditure on meters; and during the past year the following sums were spent and borne by revenue, previously capitalized: Meters, £1068; and repairs to retorts, £422. These items of necessity will call for repetition, until the arrears of repairs and renewals are wiped-off. There has also been a sum of £774 on work that will not require repeating for some considerable period.

The production of gas during the year was 200,901,000 c.ft., as compared with 199,991,000 c.ft. the previous year. The unaccounted-for gas amounted to 8·33 p.ct., which was only 266,429 c.ft. per mile of main. As the upright burners are far from efficient for street-lighting purposes, it is intended to scrap them and substitute a more

modern type of burner. This will result in a saving on gas consumed, and also bring down the number of mantle replacements.

Before the stoppage at the end of March, coal deliveries were well maintained, and there was no difficulty in keeping reasonable stocks. The material obtained was, however, far from satisfactory, and contained much inert matter that was useless. It is hoped that, with decontrol and a return to a competitive market, the content of useless rubbish in coal will be considerably reduced. The average gross cost of coal delivered on the works was 40s. 6·56d. per ton, as against 30s. 0·84d. per ton for the previous year. The average yield of gas per ton of coal carbonized was 16,314 c.ft. compared with 16,021 c.ft. for the previous year, being an increase of 293 c.ft. per ton

SATISFACTORY REPORT AT STOKE.

Presenting the report of the Gas Committee to the Stoke-on-Trent Borough Council, Alderman A. Brookhouse (the Chairman of the Gas Committee) reported with pleasure that the financial statement to the end of March last showed a credit balance, instead of a deficit as previously. They had a credit balance of just under £10,000 on the four undertakings—Burslem, Stoke, Fenton, and Longton. There was an increase of gas made as between the year ended March, 1920, and that ended March, 1921, at all the works. He found that the increase between 1914 and 1921 was 83,532,000 c.ft., or 11·6 p.ct. on the four undertakings. This, he thought, was very satisfactory, in view of the restrictions that existed. The average price of gas in 1914 was 2s. 4¾d. per 1000 c.ft. In March last it was 4s. 3¾d. Taking a round figure, the increased costs of the undertakings must run somewhere about 130 p.ct.; and yet the price of gas had been raised only 80 p.ct. They had always had a considerable amount of unaccounted-for gas. In 1917, when their present Chief Engineer (Mr. A. Mackay) took charge, the unaccounted-for gas at Burslem was 10·69 p.ct. For 1921 it was 7·77 p.ct., a decrease of 2·92 p.ct. At Fenton, in 1917, it was 13·89 p.ct.; in 1921 it was 10·03 p.ct., a decrease of 3·86 p.ct. At Longton, it was decreased from 15·13 p.ct. to 11·62 p.ct., a decrease of 4·61 p.ct.; and at Stoke there was the remarkable decrease of 8·53 p.ct. on a total of 18·23 p.ct. These reductions played an important part in the improved financial position. There had been an overdraft at the bank in regard to the Stoke undertaking that was in existence prior to Federation. In 1917, it was £11,034. This year it was reduced to £8554. The accounts spoke for themselves; and he would merely suggest that they emphasized the efficiency of the management of the gas undertakings. The figures in regard to unaccounted-for gas would compare favourably with those for any similar area in the country.

The following statistics, prepared by Mr. Mackay, will show at a glance the working figures for the four stations.

GENERAL RESULTS FOR THE YEAR ENDED MARCH 31, 1921.

	Burslem.	Stoke.	Fenton.	Longton.
	Cubic Feet.	Cubic Feet.	Cubic Feet.	Cubic Feet.
Coal gas made . .	260,200,000	169,306,000	169,395,000	199,254,000
Water gas made . .	—	—	—	1,070,000
	260,200,000	169,306,000	169,395,000	200,324,000
Gas sold—				
Ordinary meters .	120,669,000	57,449,700	74,803,500	74,574,100
Automatic meters	103,914,900	76,611,200	67,550,500	87,995,600
Public lighting .	12,500,000	17,675,900	8,993,000	12,652,900
Used on works, &c. .	2,902,600	1,141,600	1,055,000	1,821,700
Unaccounted for . .	20,213,500	16,427,600	16,993,000	23,279,700
	260,200,000	169,306,000	169,395,000	200,324,000
Increase of gas sold over previous year	19,674,700	13,676,000	10,096,000	9,084,700
Increase of gas sold —per cent. . . .	9·05	9·90	7·14	5·47
Coal carbonized (tons)	18,979	11,565	12,066	14,285
Gas made per ton (c.ft.).	13,709	14,639	14,039	13,949
Gas sold per ton (c.ft.)	12,491	13,120	12,543	12,201
Gas unaccounted for —p.ct.	7·77	9·70	10·03	11·62

STRIKE DIFFICULTIES AT NOTTINGHAM.

Some interesting particulars showing the difficulties under which the gas supply was partly maintained at Nottingham during the coal strike were afforded by the Mayor (Alderman H. Bowles) at a meeting of the Corporation on Monday of last week. He said the gas supply was to be extended that day and onwards until 5 o'clock each afternoon; it having been previously cut off at 2 o'clock daily.

When the Special Emergency Committee appointed to deal with matters during the continuance of the strike originally entered upon their duties, they were faced with the alternatives of giving as much lighting as possible to the public and cutting-down gas for industrial purposes, or keeping industry going and giving employment to as many people as possible. The Committee decided that the best policy was to keep the works of the city going, and there had been no firm able to work less than half-time, while in many cases the period had been considerably more. When the Committee took over affairs on April 1 there were 24,000 tons of coal in stock at the gas-works; and they felt justified in carrying-on without change for a period. But things got worse, and 1400 tons out of the stock had to be supplied to the Electricity Department for domestic use. At a later stage, the gas had to be cut off at 4 o'clock in the afternoon; but they were fortunate in securing some French coal, and were able to continue the gas supply again until 5 o'clock. It was unhappily found, however, that two tons of the French coal were required to do what one ton had done previously, and as to keep going until 5 o'clock would mean doubling the number of retorts, the gas had to be cut off at 2 o'clock. It had become necessary, in order to maintain even a limited supply of power and light, to purchase 9723 tons of French and Canadian coal, over and above what they had been able to procure in the neighbourhood of Nottingham.

It was remarkable, too, that while the hours were restricted, with the exception of Whit Week, there had been as much gas used during the whole period, within 2½ p.ct., as in the same period last year.

STOURBRIDGE GAS DEPARTMENT ACCOUNTS.

In his sixteenth annual report, Mr. Charles H. Webb, M.Sc., Engineer and Manager of the Borough of Stourbridge Gas Department, says that, for the year ended March 31, the sales of gas by ordinary and prepayment meters and for public lighting show increases amounting altogether to over 21 million c.ft. The gas used on the works has also increased somewhat, due to the greater employment of gas-engine power for driving machinery. The percentage of gas unaccounted-for was reduced from 5·12 to 5·08, being on a larger annual make, which has now reached the figure of 336,174,000 c.ft.

On revenue account the expenses increased very much; and in order to maintain the financial results on a similar basis to the previous year, it was found necessary to increase the price of gas twice—by 6d. per 1000 c.ft. These alterations, as anticipated, increased the balance on the revenue account by £2514. This balance is, on the present occasion, subject to increased charges for income-tax, annual instalments, expenditure on mains, services, and meters, and an estimated amount of £1000 for sinking fund charges on the vertical retort loan. The effect of these charges is that the surplus for the year is £3322, being an increase on the preceding year of £639.

During the year a contract was made with the Woodall-Duckham Company for an installation of their retorts capable of carbonizing 80 tons per day. The erection commenced early this year, and is proceeding rapidly. Mr. Webb hopes that the plant will be completed in time for use during next winter season. Otherwise, if the present rate of increase is maintained, there will be considerable difficulty in getting through the peak-load at Christmas.

The working statement shows that the make of coal gas per ton of coal carbonized was 12,827 c.ft. The net proceeds of residuals on the cost of coal and oil were 61·19 p.ct.

GAS-WORKS PURCHASE BY SPENBOROUGH.

Mr. H. C. Honey, as Director of Gas Administration, conducted an inquiry at the Cleckheaton Town Hall, relative to the application of the Spenborough Urban District Council for authority to acquire the undertakings of the Heckmondwike and Liversedge Gas Company and the Gomersal Gas Company. The only opposition was from the Heckmondwike Urban District Council (whose gas area is within the scope of the Heckmondwike Gas Company's undertaking). They were represented by Mr. G. W. Bailey; the Spenborough case being conducted by Mr. Ralph Bury.

After opening statements, and evidence by Mr. Henry Hirst (the Chairman of the Spenborough Council), the Inspector, on a contentious point as to a proposed differential charge for gas supplied within the Heckmondwike township, said the matter generally seemed to him a business proposition quite easy of settlement between business men. He suggested, therefore, that the parties should confer with a view to their arriving at an arrangement. This advice was followed during an adjournment; and Mr. Bury afterwards intimated that an understanding had been arrived at with Heckmondwike, who are to have the option any time within the next four years of purchasing such part of the gas undertaking as is within their area. If this course is adopted, they are to take a bulk supply from Spenborough for at least seven years. Further, it was agreed to drop the clause as to differential rating, and to make the same charges for gas as in Spenborough over all the out-districts in the added area of supply.

The Inspector congratulated all parties on having had the good sense to come to an agreement.

WEST BROMWICH GAS ACCOUNTS.

The annual report of the West Bromwich gas undertaking was presented to a meeting of the Town Council last week.

The report stated that the borrowing powers for the purpose of the undertaking amount to £236,899, an additional sum of £15,000 having been granted during the year on account of new mains and meters in connection with the local housing scheme. The total capital expenditure on the undertaking amounts to £264,577, towards which provision for redemption has been made to the extent of £197,141, partly by contributions and accumulations of sinking fund instalments and partly by direct contributions from revenue to meet capital outlay. The loans outstanding amount to £134,207, and the net indebtedness on the undertaking, after deducting £66,985 accumulated in the loans fund redemption account, amounts to £67,436.

The total income for the year on the revenue account amounted to £155,825, compared with £124,170 in the previous year, an increase of £31,654. The net income from the sales of gas amounted to £95,216, an increase of £14,330. As from July 1 last, the prices of all supplies for lighting and manufacturing purposes were increased by 6d. per 1000 c.ft., making the figures 4s. 7d. and 4s. 8d. for manufacturing purposes, and 5s. and 4s. 10d. for lighting. In the case of

slot meters, the full benefit of the increased prices has not been realized, owing to the mechanism of meters having to be altered to correspond with the advance in price. The average price obtained for all gas sold (excluding public lighting) was 4s. 8·94d. per 1000 c.ft., or, less discount, 4s. 7·16d. The number of houses in the borough in November last was 14,825, of which 5906 were supplied with gas by ordinary meters, and 6166 by prepayment meters. The total number of consumers of all classes at the end of the financial year was 22,481, a decrease of 24. The total length of mains laid is 53 miles 520 yards; the total number of consumers per mile being 234. The amount derived from residuals was £52,819, as compared with £36,614 the previous year, an increase of £16,204. The amount received from the sales of gas-fittings, the sale and hire of gas stoves and fires, and for the maintenance of incandescent burners and mantles on consumers' premises amounted to £6520, an increase of £1568.

The total expenditure on revenue account amounted to £143,689, compared with £113,852 the previous year, or an increase of £29,837. Manufacturing charges amounted to £112,116, an increase of £22,755; distribution expenses came to £10,132; rents, rates, and taxes, cost £9694; management expenses were £4656; and gas stoves and fittings cost £5822. The net cost of manufacturing, after deducting the income from residual products, was 2s. 10·01d. per 1000 c.ft. of gas sold, compared with 2s. 2·522d. the previous year; while the total cost, inclusive of all expenses and interest and sinking fund charges, was 4s. 5·43d. per 1000 c.ft. The gross profit for the year carried to the net revenue account was £12,136, as compared with £10,318 the previous year, an increase of £1818. The net revenue account has been charged with £1967 in respect of interest on capital and £6149 for instalments towards the redemption of loans. The total loan charges amount to £8115, compared with £8235. After these charges there remains a net profit for the year amounting to £4021, compared with a profit of £2083 for the previous year. The net revenue appropriation account shows a balance of £4532, brought forward from the previous year. To this amount the net profit for the year of £4021 is added; thus giving a total balance on the account of £8553 to be carried forward unappropriated.

THE NITRATE OF SODA POSITION.

Summarizing the trade in nitrate of soda during the first half of the present year, Messrs. W. Montgomery & Co., Ltd., say that the actual record of the six months is one of continued disappointment, without a single ray to brighten the dreary experience of the spring. The period, in fact, has been a trying one for importers, merchants, and dealers. The high hopes entertained a year ago, of a return to normal consumption of fertilizers in Europe, were, of necessity, modified towards the end of last year by reason of the world-wide financial crisis, and stagnation of trade. Large quantities of the fertilizer had been provided for the season's consumption, at a cost in Europe of £24 to £25 per ton. Buyers, however, held aloof; business was at a standstill; and values dropped in January to 16s. to 16s. 6d. per cwt. delivered. The outlook soon became increasingly serious; and the only alternative to a breakdown, in view of the enormous stocks on hand and to arrive, and the continued abstention of buyers, seemed to be an arrangement among European holders. A pool was accordingly formed, with the immediate result of a stabilization of prices; but the demand falling off in the United States, the Americans succeded in effecting sales on the European market. The Nitrate Association had already intimated that the price of 17s. per quintal, ruling for April shipment, would be extended to the months of May and June. It was later announced that the Association's prices for July, 1921, to March, 1922, would not be fixed at a lower figure than 14s. per quintal. The experience of a decreased consumption during the past season, and the extraordinary conditions prevailing to-day, the firm point out, are not singular to nitrate. There has been a very serious falling off in the demand for all classes of manures. Germany, who in the spring of 1914 consumed about 680,000 tons of nitrate of soda, has during the past season, taken practically no interest in the article. Her synthetic nitrogen factories, have produced and delivered, in various forms, nitrogenous fertilizers fully equal to, if not exceeding, the normal quantity of nitrate of soda formerly imported from Chili. Negotiations are taking place with the object of devising a satisfactory scheme which will enable realization of unsold nitrate stocks, continuation of production on a limited scale, and resumption of shipments from Chili. In Messrs. Montgomery's opinion, the true interests of the trade are better served with a free market and open competition. But the times are still abnormal; and in order to safely bridge the intervening gulf, it is essential, for a year at least, that there should be some guarantee of stability of prices at a fair level, to show profit on cost of production, and a margin to distributors. Otherwise, it seems to them, there is only disaster in sight for the industry.

In the course of some remarks on the future outlook, Messrs. Aikman, Ltd., say the nitrate industry is at present passing through one of the periodical crises to which the trade has always been subject; but there is every reason to think that this is only a temporary condition, and one largely created by the general economic position, and not by any change in sentiment on the part of the world's consumers of nitrogen. The present abnormal position has resulted in numerous concerns closing-down; and the monthly production in Chili has now fallen to under 100,000 tons, against an average of about 210,000 tons monthly last year. The cost of production, owing to lower exchange, &c., shows an important decrease, and is now estimated at only 6s. to 8s. per quintal, except in a few isolated cases. The future is, however, not yet clear, though an agreement with competitive nitrogen producers to stabilize prices at about £15 per ton would undoubtedly leave a very satisfactory margin of profit on the basis of present costs.

In view of the suspension of street lighting for the summer at Bradford, as a measure of public economy, 120 lamplighters, who are thrown temporarily out of work, are being employed in painting the lamp-standards, at an estimated cost of £1680.

TRADE NOTES.

[For "Journal" Advertisers.]

New Season Lighting Specialities.

The general catalogue of gas lighting and heating specialities for the season 1921-22 of Messrs. J. & W. B. Smith, Ltd., Farringdon Road, E.C., is an extensive one, indicating a large and progressive business. All kinds of gas-fittings are adequately represented—in many cases by patterns with which the name of the firm is already identified throughout the industry. Among these may be mentioned "Glasmi" mantles and burners, and "Briton" and "Silva" lamps for both indoor and outdoor lighting. Of the "Silva" outdoor lamp, we learn that over 50,000 are now in use. They are made with a special view to low cost of maintenance. Every part is easy of access, and can be renewed with the minimum of trouble and expense. Silk and beaded shades are illustrated in wide variety—a remark which also applies to glassware. Mention may also be made of a range of pendants for semi-indirect lighting. These are substantially made and of attractive appearance, and fitted with the "Glasmi" superheater cluster an effective illumination results.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *July* 11.

The market for tar products continues quiet; and there is no particular change to report in prices. There is a moderate amount of inquiry for pitch for next season's delivery, and buyers are coming up gradually in their ideas of value. Road tar continues a good market, and large quantities are being delivered. Pure benzole and pure toluol are steady at about 3s. to 3s. 3d. per gallon. Solvent naphtha is from 2s. 9d. to 2s. 10½d. per gallon. Creosote is about 9d. per gallon.

In sulphate of ammonia there is nothing to report.

Tar Products in the Provinces.

July 11.

The average values for gas-works products during the week were: Gas-works coal tar, 61s. to 65s. Pitch, East Coast, 80s. to 82s. 6d.; West Coast—Manchester, 77s. 6d. to 80s.; Liverpool, 77s. 6d. to 80s.; Clyde, 77s. 6d. to 80s. Benzole 90 p.ct. North, 2s. 4d. to 2s. 6d.; crude 65 p.ct. at 120° C., 1s. 11d. to 2s. naked at makers' works; 50-90 p.ct., naked, North, 2s. 3d. to 2s. 4d. Toluol, naked, North, 3s. to 3s. 1½d. nominal. Coal tar crude naphtha in bulk, North, 11d. to 11½d. Solvent naphtha, naked, North, 2s. 5d. to 2s. 6d. Heavy naphtha, North, 2s. 7d. to 2s. 9d. Creosote, in bulk, North, liquid, 9¼d. to 9½d.; salty, 8½d. to 8⅝d. Heavy oils, in bulk, North, 10½d. to 11½d. Carbolic acid, 60 p.ct., 1s. 6d. Naphthalene, £20 to £30; salts, £7 to £9, bags included. Anthracene, "A" quality, 8d. to 10d. per minimum 40 p.ct.; "B" quality, nominal.

FROM A MARKET CORRESPONDENT.

Tar Products.

Although there is not much business doing yet in coal tar products, supplies for prompt delivery are increasingly difficult to obtain. There is very little pitch on the market at the moment. It is not clear whether the majority of coke-ovens will start up immediately the supply of fuel enables them to do so; and, consequently, there may not be any great production of pitch for some time. Meantime, there is good inquiry for forward deliveries without much business, because sellers are uncertain as to the price at which it is safe to offer. The general idea is about 77s. 6d. per ton; but buyers seem to want something lower than this. Creosote remains fairly steady at about 7½d. to 8d. per gallon; but cheaper supplies of fuel oil are somewhat against this product at the moment. Naphthalenes are unchanged with only a poor demand. There is a much better request for solvent naphtha, and supplies are insufficient for the needs of buyers. There is a better demand from the rubber works in this line. Crude carbolic acid remains at 1s. 6d. to 1s. 8d. per gallon, and crystals 6½d. per lb. Cresylic acid is quiet at 2s. 4d. per gallon for pale 97-99 p.ct. and 2s. 2d. for dark 95-97 p.ct. In intermediate products there has been much better inquiry since the settlement of the coal strike. The actual business passing is small; but better conditions are being expected in the early future. Salicylic acid continues firm, with an upward tendency, at 1s. 4d. per lb. for technical grade; but the export demand in aniline oil and salts has fallen off altogether. From America it is reported that the tone of coal-tar products has been very steady of late, although there has been no tendency to purchase other than on a hand-to-mouth basis. Trading is developing, however, and some of the more stagnant materials are beginning to move into consuming channels again. While the summer period will be attended with the usual quiet trading, the outlook is distinctly healthy, and no set-backs are expected. Prices are well maintained, with few forced sales noticeable among the offerings.

Sulphate of Ammonia.

The reduction in the price of sulphate of ammonia has been more drastic than at first glance seemed to be the case; and the grumbling British farmer should now be more than satisfied with the price at which he can buy this fertilizer. Four grades of sulphate have been established; the lowest being 24⅜ p.ct. material, for which the price has been fixed at £12 17s. No. 3 grade, a 25 p.ct. material, is chargeable at £13 per ton, and No. 2 at £13 3s. Then there is a neutral sulphate classed as No. 1 grade, the price for which is £13 16s. 6d. per ton for unground material and £14 6s. per ton for ground material. Business at the present time, however, is small; but the stimulation of production at the ending of the coal strike will possibly arouse a

little more attention on the part of buyers. Export prices remain unchanged at about £16 per ton f.o.b.; but a rather lower price has been accepted in certain recent cases. The exports of sulphate of ammonia during the month of June amounted to 4984 tons, having a value of £78,875, comparing with 1596 tons, valued at £162,454, in June last year. It is satisfactory to note that Japan, which was one of our largest customers for sulphate in pre-war days, is again heading the list—taking 2332 tons in June this year. She is followed by the British West Indian Islands and British Guiana, with 1060 tons, and Spain and the Canary Islands, with 419 tons. For the six months ended June 30 our exports have been 70,828 tons, valued at £1,791,395, which compares with 45,930 tons, valued at £1,339,588, for the corresponding period in 1920, and 165,683 tons, valued at £2,309,693, for the first six months of 1913. From America it is reported that there has been a better inquiry during the past few weeks, although trading has not been sufficiently great to have any material effect upon the market. There have been many reports and rumours in circulation that large inquiries for this fertilizer are appearing in the market in Japan and in the far East generally; and although fair-sized contracts are reported to have been closed for the rest of the year, resumption of export business has been negligible.

Shanghai Gas Company, Ltd.—At the annual meeting of the Company, which was held on April 21 in Shanghai, the Chairman (Mr. E. I. Ezra) said the results shown by the balance-sheet were highly satisfactory. The increased cost of Japanese coal, however, left them with no alternative but to raise the charges for gas. The higher cost of manufacture would then be borne partly by the consumers and partly by the Company. Mr. F. W. Potter (Engineer-in-Chief) reported that during the year 1920 the quantity of gas sold to private consumers was 471,960,700 c.ft., which was an increase over the previous year of about 3½ p.ct.

Oldbury and the Coal Strike.—At the commencement of the coal strike, the Oldbury Urban District Council Gas Department had barely a normal month's coal supply in stock; but Mr. C. H. Carder (the Engineer and General Manager) has lasted-out the whole period with this, by the aid of his carburetted water-gas plant. No restrictions of any kind have been imposed on the consumption of gas; and no foreign coal has been brought in. Referring to the matter at the last meeting of the Council, Mr. Chance said he thought Mr. Carder should be congratulated on his success. He had had a very difficult time, and a great responsibility; and he (Mr. Chance) knew by the coal he had got left that he had carried out the work well. It had been a costly matter in some ways; but this was a minor point as compared with the fact that the people had been able to draw gas as and when they required to use it. On the motion of Mr. Wallace, a hearty vote of thanks was passed to Mr. Chance (as Chairman of the Committee) and to Mr. Carder for their excellent services during the dispute.

Price Increased at Darlington.—The Darlington Town Council last Thursday adopted a recommendation that, owing to the abnormal cost of coal, the price of gas should be increased 4d. per 1000 c.ft. Alderman Sir Charles Starmer stated that, to keep the gas-works going, they had purchased Belgian coal at a cost of £6918 beyond the additional cost previously reported; and the extra 4d. would just about balance this amount.

South London Gas Price.—The July issue of the "Co-Partnership Journal of the South Metropolitan Gas Company" says that the substantial reduction in the market value of residuals and the prolonged stoppage of British coal mines have made it necessary to raise, temporarily, the price of gas to 11½d. per therm as from Midsummer. During the miners' strike the supply of gas was unimpaired in quality and quantity; but the importation of coal from France, Canada, and the United States has been very costly, and the commandeering of coal and the restriction of coke sales added to the difficulties of the Company. At the advanced price, there can be no further accumulation of co-partnership bonus; but co-partners know that every effort will be made to reduce the price as quickly as circumstances permit.

Blackburn Gas Accounts.—The annual report of the Blackburn Gas Engineer (Mr. G. P. Mitchell) shows that the quantity of gas manufactured in the past year was 843,712,000 c.ft.—33,009,000 c.ft. more than in the previous year. A total of 58,810 tons of coal was carbonized, against 60,123 tons; and the gas made was 12,883 c.ft. per ton, against 11,668 c.ft., and that sold 12,122 c.ft., compared with 10,748 c.ft. The income from residual products was £90,531, against £60,449 for the preceding year, and £49,299 in 1918-19. The income amounted to £285,863, and after meeting all charges there is a net profit of £817. Mr. Mitchell says the vertical retorts have not been completed through labour difficulties and shortage of material. It is now hoped to have one section ready by the end of August. Mr. Hamer (Chairman of the Gas Committee) pointed out that the make and sale of gas per ton were higher than in any previous year.

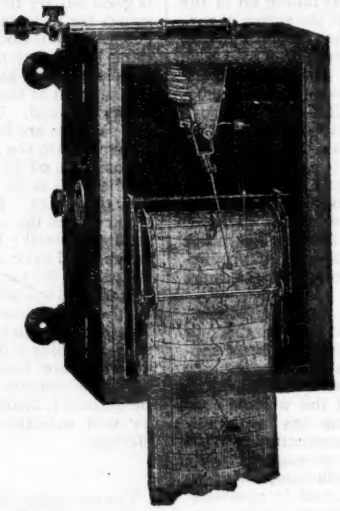
Kendal Gas Department.—The report of Mr. W. R. Wilson, the Manager of the Kendal Corporation Gas-Works, for the year ended March 31, states that the gross profit amounts to £4568, to which must be added £434 interest. After setting aside £4513 for interest and sinking fund charges and £31 for bank interest, the net profit amounts to £516. Out of the accumulated surplus of £2316, the Corporation voted £200 to the renewals account, £212 to the deficit in the Water Department, and £680 in relief of rates. During the year the total quantity of coal carbonized amounted to 7185 tons, being an increase of 528 tons, or 7·93 p.ct. on the previous year. The cost of coal delivered upon the works was 46s. 7d. per ton. The total quantity of gas made was 105,278,500 c.ft., being a decrease of 554,300 c.ft. A small unit of plant on the "Sittingbourne" system of total carbonization is being installed, and will be useful as a reserve for summer load, repairs, and breakdowns, and in case of difficulties in the supply of coal.

SIMMANCE'S DEAD BEAT RECORDER

TAPE CHART PATTERN

For Pressure or Vacuum.

NO LIQUIDS USED.



The chart roll is renewed 6 times a year.

The record can be torn off at any interval.

Lowest Range: 0-2 inches water.

Highest Range: 0-300 lbs. per sq. inch.

Suitable for Gas, Air, Water, or Steam, and may be used on Crude Gas.

MAKERS:

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Record Output at Barnstaple.—Despite the reduction in public lighting, the easing of district pressures, and appeals to gas users for economy, it has been found by the Barnstaple Gas Company that the quantity of gas used during the past quarter has exceeded that for the corresponding period of any previous year. This presumably points to an increased use of gas-cookers, consequent on the coal shortage.

Barnoldswick Gas Supply.—Barnoldswick, Yorkshire (a town which has developed greatly since the days when the gas plant was installed), is in prospective difficulty as to gas supply for the winter. Several months ago contracts were placed for horizontal retorts (expected within two months) and the renewal of vertical retorts by September. As neither work has yet begun, the Council have decided to send a deputation to the contractors, pointing out the urgency of the matter. Inquiries are being made as to water-gas plant, the adoption of which will be seriously considered if progress is not made quickly.

Ellesmere Gas-Works.—At a meeting of the Ellesmere Urban District Council last week, it was reported that no gas had been made during last month, but that repairs had been executed at the gas-works. The Chairman said that before the works restarted, when coal was available, he thought that something should be done to alter the old state of affairs, so that they could make more and better gas than in the past. They had to retrieve their position. After some discussion, it was decided that a Committee consisting of the whole Council should go into the matter, and see what improvements could be effected generally.

Lytham Gas Undertaking.—Mr. Chadwick, the Chairman of the Lytham Urban District Council Gas Committee, has presented his annual report to the Council. He said the total receipts were £40,290, and the expenditure £33,227, leaving a gross profit of £7062. The net profit was £6072. From this the Finance Committee obtained £2000 for the reduction of the rates. The department had been very fortunate; otherwise they would not have had this profit. He dare not tell them what the gas had cost. The quantity delivered last year was 140,250,000 c.ft., and this past year 120,000,000 c ft. They were fortunate in the fact that residuals realized 81 p.ct. of the cost of coal.

Annual Report at Morley.—The annual report of Mr. H. J. Hemingway, the General Manager of the Morley Corporation Gas-Works, for the year ended March 31 last, shows a net deficit of £937, as against a profit of £768 last year. He attributes the result to the reduction in consumption owing to the industrial depression, the sales having declined from 130,000,000 c.ft. to 115,000,000 c.ft.; to the high cost of coal (increased from £14,998 to £19 489) and its poor quality; to the heavy expenditure on renewals of mains, works, and meters; to the increase in rates, taxes, loan interest, and sinking fund; and to the high wages, which increased by £1754. The gas produced amounted to 136,500,000 c.ft., a reduction of 10,890,000 c.ft. He stated that the financial prospects for the coming year are very gloomy. A Sub-Committee has been appointed to consider whether any change should be made in gas charges.

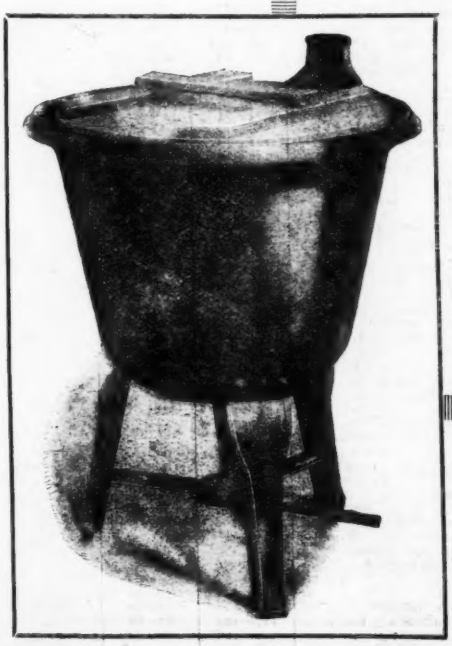
Thanks at Dewsbury.—At the Dewsbury Town Council meeting last week, Alderman M'Cann (the Chairman of the Gas Committee) heartily congratulated Mr. G. W. Fligg, the Manager and Engineer, and Mr. G. H. Fligg, the Assistant Manager, on the excellent manner in which they had conducted gas supply under great difficulty during the coal stoppage. The expression of thanks was endorsed by the meeting.

Price of Gas at Walsall.—The Gas Committee of the Walsall Town Council have recommended that, having regard to the automatic reduction in wages affecting all gas workers throughout the country, and to the economies which will be effected by reducing the number of men at the works whose services are no longer required, the Committee do not consider an increase in the price of gas necessary; and that the previous resolution raising the price be rescinded.

Plymouth on the Therm Basis.—An order made by the Board of Trade, fixing a standard price in respect of gas supplied by the Plymouth and Stonehouse Gas Company came into operation on May 25. Reporting on the effect of the Order to the Special Purposes Committee, the Town Clerk pointed out that, whereas the Company applied for a standard price of 14·6d. per therm, instead of 2s. 6d. per 1000 c.ft., for supply in the borough, they had been granted 12·6d. per therm.

Foreign Coal at Teignmouth.—A serious position was revealed to the Teignmouth Urban District Council last week, when Mr. Rogers complained of an inadequate gas supply. The Gas Manager (Mr. H. Higham) said that some foreign coal they were obliged to use would not burn, let alone make gas. They would have to put up with an inadequate supply at a higher expense. The Council were losing something like £300 a week on present supplies. Unless they could get better coal, they would have to close-down the works. The Surveyor (Mr. F. W. Knight) pointed out that this would mean stopping the engines at the water-works. Mr. Carver expressed the opinion that the Gas Manager should have reported on the situation before; and Mr. Higham said it would have been impossible to obtain coal. A Sub-Committee was appointed to consider the purchase of coal.

Bradford's Gas Success During the Strike.—A report presented last week by Mr. Charles Wood, the Bradford Corporation Gas Engineer and Coal Officer during the strike period, stated that Bradford had the distinction of being the only large municipal authority in the country which did not find it necessary to purchase outside coal to maintain the gas supply. Full pressure was given throughout the strike. When the strike began, the gas department had 31,500 tons of coal, and the electricity department had 8000 tons. From the gas department 6700 tons of coal was issued for public domestic use, and only 1284 tons remained when the strike ended. Coal had since been coming in daily in increasing quantities. During the strike, 4000 tons of coal, fit for gas production, was obtained from the filter beds at the Esholt sewage works of the Corporation. Despite all conditions, the gas produced during the past month, said Mr. Wood, had totalled 127,300,000 c.ft.



MAIN'S LAUNDRESS BOILER.

An "All-Cast" Boiler of new design. Constructed throughout of strong cast iron. Hob galvanized. Boiling pan made rustless. Lift-off lid, either wood or galvanized sheet iron.

Splash edge provided on top, which drains inside the boiler. Combined flue and condense outlet mounted on swivel hob, so that it can be placed in a position most convenient to the flue exit.

Drip-proof burner of novel construction fitted with gas regulator. Coneless flame with increased efficiency. Either fixed or removable at will. Fitted with a swing gas connection which receives the gas supply from any direction

R. & A. MAIN, LTD.,

EDMONTON, N. 18., FALKIRK, &c.

Douglas (Lanarkshire) Gas-Works Purchase.—The Upper Ward District Committee of Lanarkshire have agreed to purchase the Douglas Gas-Works, and have appointed Mr. John D. Luck, of Carluke, and Mr. William H. M'Kerracher, of Lesmahagow, to report.

A heap of oxide of iron was ignited, apparently by the intense heat of the sun, at the Newport (Isle of Wight) Gas-Works; and the Fire Brigade spent two hours in extinguishing the flames.

The issue of £69,835 of 7½ p.ct. redeemable debenture stock which Messrs. A. & W. Richards recently made for the Plymouth and Stonehouse Gas Light and Coke Company was considerably over-subscribed. The same remark applies to the £30,000 of 7½ p.ct. debenture stock in the Redhill Gas Company; and it is gratifying to learn that issues of stock which the same firm have made recently for the Southgate and North Middlesex Gas Companies were also over-subscribed.

To meet the demands of their largely increased business, the Turbine Furnace Company have removed their general offices from Budge Row to No. 238B, Gray's Inn Road, W.C. 1.

A South African company is stated to have been formed for the production and marketing of "penrol," a gasoline substitute. The new fuel will be made principally from alcohol obtained from locally grown maize or corn. The selling price will be considerably below gasoline; and the new fuel is claimed to be non-corrosive, smokeless, and stainless. It does not carbonize, and has no smell.

An outing of the London staff of Messrs. Falk, Stadelmann, and Co., Ltd., took place on the 4th inst. The party, numbering 630, travelled by motor coaches to Southend-on-Sea, where luncheon was served at the Palace Hotel. Following the Loyal toast, Mr. Stockwell, the Senior Representative of the firm, proposed "The Firm," which was replied to by the Chairman, Mr. Max Falk. A thoroughly enjoyable day was spent.

STOCK MARKET REPORT.

The improvement in things on the Stock Exchange noted a week ago did not last long; and the week just concluded presented a disagreeable contrast. A variety of causes conspired to operate this, among which was dissatisfaction at the maintenance of the Bank rate at 6 p.ct. Business was slack, and most markets were distinctly dull.

The gilt-edged class sharply reflected the ruling tendency. Home Government issues of all forms suffered a set-back. The big four's figures on Friday were: Consols 47⅝—48, War Loan 88½—88⅞, Funding 70⅝—71⅛. Victory 76⅜—77⅛. Bonds shared the same fate; but Indians and one or two Colonials were fairly steady. Home Rails were dull, and so were Argentine; but Canadians were not hurt.

The Foreign Market maintained some good points, French, Belgium, Argentine, and Brazilian being noticeable.

The Miscellaneous Market was dull. Rubber and Oil were patchy, and Industrials (especially Textiles and Iron and Steel) weak.

Business in the Gas Market was well abreast of the previous week in point of activity, and rather in advance of it in point of firmness. In the London Companies, ordinary stocks touched higher prices; and Gas Light and South Metropolitan preferences advanced quotations. In Suburban and Provincial, buyers of Brighton and Hove issues raised their prices, and quotations of British debenture, Sheffield "C," South Suburban, and Tottenham "A" were advanced 2 each. Imperial Continental was very quiet and unchanged.

Bargains done for cash during the week were as follows: On Monday, Continental Union 18, Gas Light ordinary 55⅜, 56, 56⅛, ditto preference 59, ditto debenture 50⅜, ditto 10 p.ct. bonds 132, Imperial Continental 132⅛, ditto debenture 80, Maidstone debenture 42, South Metropolitan 68, South Suburban 62, Croydon 5 p.ct. "D" 65½, Hornsey 10 p.ct. 100. On Tuesday, British 22 15/16, Continental Union 20, ditto preference 32, Gas Light ordinary 55⅛, 55⅜, 56, 56⅛, 56⅛, ditto maximum 43, ditto preference 60, ditto debenture 50⅜, ditto 10 p.ct. bonds 133, Imperial Continental 131, 133⅜, South Metropolitan 67⅛, 68, 68⅛, Barnet "D" 68, 68⅜, Cardiff 7½ p.ct. debenture fully-paid 100⅛. On Wednesday, Brentford "A" 65, British debenture 54⅛, 55⅛, Gas Light ordinary 55⅞, 56, 56⅛, ditto debenture 51, Imperial Continental debenture 80⅛, Lea Bridge 69, Primitiva preference 25, South Metropolitan 68, Tottenham "A" 59½. 60, ditto "B" 54⅛, 54⅜, Cardiff 7½ p.ct. debenture, £50 paid, 50. On Thursday, British 22⅛, 23, Continental Union 20, Gas Light ordinary 55⅛, 55⅞, ditto maximum 43, ditto preference 58⅛, ditto debenture 50⅛, 51, Primitiva preference 24s., South Metropolitan 67½, 68, 68⅛, 68⅜, Tottenham "A" 62, ditto "B" 53, 54, Cardiff 7½ p.ct. debenture, £50 paid, 50, Pinner 10½. p.ct. "A" 8⅝, ditto 7 p.ct. "B" 5⅜. On Friday, Bombay 3¾, Bournemouth "B" 8 13/16, 8⅞, ditto 3 p.ct. debenture 45⅛, Brentford "A" 66, 68, Brighton and Hove "A" 71, 71½, Gas Light ordinary 56⅛, ditto debenture 51, Imperial Continental 132 (and exceptional 112½, 113½), South Metropolitan 68⅜, Tottenham "B" 53⅜, Brighton and Hove 5 p.ct. debenture 74½. 75.

In the Money Market, the characteristic at first was firmness; but this soon relaxed, and then the position was quite easy. Discount terms were also lower. Silver was firm. The Bank rate is 6 p.ct., as fixed on June 23.

The Vertical Gas-Retort Syndicate, Ltd., have recently received orders for "Simplex" water-gas plants from the Newmarket, Chepstow, and Woolton Gas Companies.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue.	Share.	When ex-Dividend.	Ante-War Dividend & Bonus.	Last Dividend.	NAME.	Closing Prices, July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
£			p.c.					
182,049	Stk.	Mar. 11	4	4%	Aldershot 4 p.c. Pref.	...	53—58	...
1,551,868	,,	Apl. 14	2½	3⅛%	Alliance & Dublin Ord.	59—64	39—44	...
374,000	,,	Jan. 13	4	4%	Do. 4 p.c. Deb.	76—79	47—52	...
280,000	5	Oct. 28	7½	8%	Bombay, Ltd.	5⅛—6⅛	3⅛—4⅛	3⅛
100,000	5	Feb. 25	16	5%	Bournemouth Gas and Water: 5 p.c.	...	7¼—8½	...
383,110	10	,,	7	7%	Bournemouth Gas and Water: B 7 p.c.	15—15½	8¼—9¼	8¼—8½
115,000	10	,,	6	6/-	Bournemouth Gas and Water: Pref. 6 p.c.	13½—14	7¼—8½	...
162,063	—	June 30	—	4%	Bournemouth Gas and Water: 4 p.c. Deb.	...	54—59*	...
992,043	Stk.	Feb. 25	14	30/-	Brentford A Consolid.	261—266	66—71	65—68
734,920	,,	,,	11	26/3	Do. B New	204—209	60—65	...
55,000	,,	,,	5	5%	Do. 5 p.c. Pref.	109—111	68—73	...
221,400	,,	June 15	4	4%	Do. 4 p.c. Deb.	91—93	56—58	...
214,775	,,	Mar. 11	11	7½%	Brighton & Hove Orig.	208—213	97—102	...
244,200	,,	,,	8	5⅛%	Do. A Ord. Stk.	154—159	68—73	71—71½
1,287,500	Stk.	July 29	5	5%	Bristol 5 p.c. max.	...	...	...
530,000	20	Mar. 30	12½	10%	British	44—45	22—24	22½—23
120,000	Stk.	June 30	4	4%	Do. 4 p.c. Deb. Stk.	88—90	53—56*	54½—55½
245,771	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	36—39*	...
100,000	10	May 27	—	6%	Cape Town & Dis., Ltd.	1½—2½	6¼—7¼	...
100,000	10	Apl. 28	—	4½%	Do. 4½ p.c. Pref.	4—6	4½—5½	...
100,000	Stk.	June 30	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	53—58*	...
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	...	...
1,513,280	,,	Feb. 25	5/9/4	30/-	Commercial 4 p.c. Stk.	106—108	55—60	...
560,080	,,	,,	5⅛	26/3	Do. 3½ p.c. do.	103—105	52—57	...
475,000	,,	June 15	5	5%	Do. 3 p.c. Deb. Stk.	69½—71½	42—45	...
800,000	,,	Dec. 11	4	—	Continental Union Ltd.	76—79	17—22	20
200,000	,,	,,	7	—	Do. 7 p.c. Pref.	115—118	30—40	32
51,600	,,	Feb. 5	15	10%	Croydon A 10 p.c.	...	125—135	...
278,400	—	,,	12	7%	Croydon B and C 7 p.c.	...	95—105	...
492,270	Stk.	—	6	4⅛%	Derby Con. Stk.	123—125	...	...
55,000	,,	—	4	4%	Do. Deb. Stk.	102—104	...	...
1,002,180	10	Jan. 29	10	5/0	European, Ltd.	17½—18	7—8	...
16,298,975	Stk.	Feb. 10	4/17/4	30/-	Gas Light and Coke: 4 p.c. Ord.	98—102	55—57	55½—56½
2,600,000	,,	,,	3⅛	26/3	Gas Light and Coke: 3½ p.c. max.	76—79	42—45	43—43½
4,062,235	,,	,,	4	4%	Gas Light and Coke: 4 p.c. Con. Pref.	96—99	57—60	58½—60
4,674,850	,,	June 15	3	3%	Gas Light and Coke: 3 p.c. Con. Deb.	72½—74½	48—51	50½—51
130,000	,,	Dec. 11	10	10%	Gas Light and Coke: 10 p.c. Bonds.	...	...	132—133
82,500	,,	Mar. 11	5	3⅛%	Hastings & St. L. 5 p.c.	...	48—53	...
258,740	,,	,,	3⅛	2½%	Do. 3½ p.c.	87—89	54—59	...
70,000	10	May 12	11	5%†	Hongkong & China, Ltd.	16½—16¾	5—6	...
86,600	Stk.	Mar. 11	9	5⅝%	Hornsey 7 p.c.	...	75—85	...
131,000	,,	Mar. 30	7½	3⅛%	Ilford A and C	151—154	76—81	...
65,780	,,	,,	6½	2½%	Do. B	125—128	55—60	...
65,500	,,	June 30	4	4%	Do. 4 p.c. Deb.	92—94	53—55*	...
1,976,000	,,	May 27	9	5%†	Imperial Continental	130—160	131—136	131—133½
1,435,000	,,	Feb. 10	3⅛	3⅛%	Do. 3½ p.c. Deb. Red.	84—86	77—82	80—80½
235,242	,,	Mar. 30	6½	3⅛%	Lea Bridge Ord. 5 p.c.	119—121	65—70	69
2,498,905	,,	Feb. 26	10	37/6	Liverpool 5 p.c. Ord. A.	211—213	...	...
					Liverpool 5 p.c. Ord. B.	146—148	...	...
306,083	,,	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	...	...	...
165,746	,,	Feb. 25	7/3/6	3⅛%	Maidstone 5 p.c.	...	52—57	...
63,480	,,	Dec. 30	—	3%	Do. 3 p.c. Deb.	...	40—43	42
75,000	5	June 11	6	3%	Malta & Mediterranean	4½—4¾	2⅛—2½	...
250,000	100	Apl. 1	4½	4½%	Met. of Melbourne: 4½ p.c. Deb.	99—101	88—93	...
541,920	Stk.	May 27	4	6%	Monte Video, Ltd.	11½—12	60—70	...
1,875,892	,,	Feb 25	4½	3⅛%	Newcastle & Gatsh'dCon.	98½—99½	59—60	...
529,705	,,	June 30	3⅛	3⅛%	Do. 3½ p.c. Deb.	82—83	48½—50½*	...
15,000	10	Mar. 11	—	8%	North Middlesex 10 p.c.	...	12½—13½	...
55,940	10	,,	7/14/10	5⅞%	,, ,, 7 p.c.	14—15	7½—8½	...
500,000	Stk.	May 12	8	8%	Oriental, Ltd.	117—122	87—92	...
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7½—7¾	2—3	...
188,120	Stk.	June 30	—	3⅛%	Plym'th & Stoneh'se 5 p.c.‡	...	53—58*	...
60,000	50	Feb. 25	13	7½%	Portsea Island, B	128—131	65—70	...
100,000	50	,,	12	6⅛%	Do. C	118—121	50—55	...
249,980	5	April 29	8	—	Primitiva Ord.	5⅜—6	1—1⅛	...
499,960	5	June 26	5	—	Do. 5 p.c. Pref.	4⅜—5	1⅛—1½	25/—26/-
521,600	100	June 1	4	4%	Do. 4 p.c. Deb.	91—93	65—67	...
600,000	Stk.	Jan. 27	4	4%	Do. ,, ,, 1911	...	37—40	...
346,198	,,	June 30	4	4%	River Plate 4 p.c. Deb.	85—87	36—39*	...
150,000	10	Mar. 30	6	6/-	San Paulo: 6 p.c. Pref.	10½—11	5⅛—6½	...
125,000	50	June 30	5	5%	San Paulo: 5 p.c. Deb.	47—49	34—39*	...
135,000	Stk.	Mar. 30	10	5%	Sheffield A	223—224	62—65	...
209,984	,,	,,	10	4½%	Do. B	222—224	62—64	...
523,500	,,	,,	10	3⅛%	Do. C	220—222	61—63	...
133,207	Stk.	Sept. 15	4	4%	Shrewsbury 5 p.c.	...	...	...
90,000	10	June 30	9	8%	South African	10½—11½	8—10*	...
6,609,893	Stk.	Feb. 10	5/4/-	5%	South Met. Ord.	111—113	67—69	67½—68½
250,000	,,	Jan. 13	—	5%	Do. Red. Pref.	...	91—93	...
1,895,443	,,	,,	3	3%	Do. 3 p.c. Deb.	72½—74½	46—49	...
224,820	,,	Feb. 25	8½	7½%	South Shields Con. Stk.	137—139	85—87	...
1,087,795	,,	,,	6	3⅛%	S'th Suburb'n Ord. 5 p.c.	114—116	60—65	...
368,837	,,	June 30	5	5%	Do. 5 p.c. Deb. Stk.	116—118	71—76*	...
647,740	,,	May 12	7½	3⅛%	Southampton Ord.	99—102	55—58	...
121,275	,,	June 30	4	4%	Do. 4 p.c. Deb. Stk.	...	56—58*	...
130,000	,,	Feb. 25	—	3⅛%	Tottenham: A 5 p.c.	135—138	59—63	59½—62
782,275	,,	,,	6	2⅛%	Tottenham District: B 5½ p.c.	115—117	50—55	53—54½
181,255	,,	June 15	4	4%	Tottenham District: 4 p.c. Deb.	87—89	52—55	...
128,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	...
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	45—50	...
236,476	Stk.	Feb. 25	5	5⅛%	Tynemouth 5 p.c. max.	108½—109	68—70	...
					Wandsworth, Wimbledon, and Epsom—			
30,000	,,	Feb. 25	8½	47/6	Wandsworth A 5 p.c.	151—156	78—83	...
255,636	,,	,,	6½	32/6	Do. B 3½ p.c.	129—134	55—60	...
108,075	,,	,,	—	33/3	Do. C	...	55—60	...
140,865	,,	,,	—	33/3	New Ordinary	...	55—60	...
352,000	,,	,,	6½	26/3	Wimbledon 5 p.c.	117—122	57—62	...
98,000	,,	,,	6½	32/6	Epsom 5 p.c.	121—126	55—60	...
88,416	,,	June 30	5	5%	5 p.c. Deb. Stk.	56—60	40—45*	...

* Ex Div. † Next dividend will be at this rate. ‡ Plymouth & Stonehouse is now quoted officially in London.

R. & J. DEMPSTER, LTD., DONNAUGHT MANSIONS, 24, VICTORIA STREET, S.W. 1. MANCHESTER. KENTISH TOWN, N.W. G. MITCHELL, FOR PATENT SLOT METER PAD & OTHER LOCKS.